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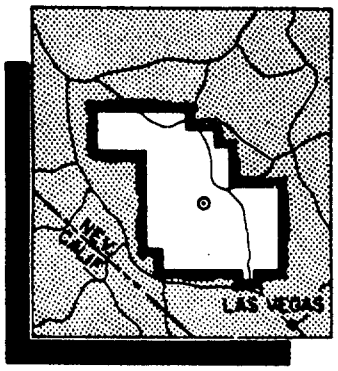
WT-1166

Operation TEAPOT

NEVADA TEST SITE

February – May 1955

RADIOLOGICAL SAFETY



ARMED FORCES SPECIAL WEAPONS PROJECT, FIELD COMMAND
SANDIA BASE, ALBUQUERQUE, NEW MEXICO

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WT-1166

Report to the Test Director

RADIOLOGICAL SAFETY

By

Lt Col Tom D. Collison, U. S. Army

Armed Forces Special Weapons Project, Field Command
Albuquerque, New Mexico
May 1955

[redacted]

SHOT SCHEDULE FOR OPERATION TEAPOT

Shot	Time	Date	Area
Wasp	1200	18 Feb. 1955	7-4
Moth	0545	22 Feb. 1955	3
Tesla	0530	1 Mar. 1955	9b
Turk	0520	7 Mar. 1955	2
Hornet	0520	12 Mar. 1955	3a
Bee	0505	22 Mar. 1955	7-1a
Ess	1230	23 Mar. 1955	10
HADR	0900	25 Mar. 1955	
Apple	0445	29 Mar. 1955	4
Wasp'	1000	29 Mar. 1955	7-4
HA	1000	2 Apr. 1955	
Post	0430	9 Apr. 1955	9c
Met	1115	15 Apr. 1955	FF
Apple II	0510	5 May 1955	1
Zucchini	0500	15 May 1955	7-1a

In order to minimize the security classification of this report, the yields and burst heights of the shots during Operation Teapot have been omitted. These may be found in WT-1158 and other reports in the Teapot series.

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CHAPTEP 1

JOINT TEST ORGANIZATION ON-SITE RAD-SAFE GROUP

1.1 INTRODUCTION

On-site Rad-Safe for Operation Teapot was the responsibility of the Test Director, J. C. Clark. Based on previous AEC-DOD agreements, the Chief, Rad-Safe Branch, Directorate of Weapons Effects Tests (DWET), Field Command, Armed Forces Special Weapons Project (AFSWP), Sandia Base, N. Mex., was appointed as On-site Rad-Safe Officer and was assigned the responsibility of organizing and commanding the On-site Rad-Safe Group. It was agreed that the 1st Rad-Safe Support Unit, Fort McClellan, Ala., would provide the nucleus and main support for this group.

Plans for the On-site Rad-Safe Group for Operation Teapot were made in the summer of 1954. It was decided that 30 officers and approximately 120 enlisted personnel would meet the Rad-Safe requirements for the operation, provided the greater number of participating projects could furnish their own monitor personnel, who would be trained in a school conducted by the Rad-Safe Group.

Arrangements for the officer and enlisted personnel were made with the following services:

Organization	Officer	Enlisted
Field Command, AFSWP, DWET	2	2
1st Rad-Safe Support Unit, Fort McClellan, Ala.	15	100
Air Matériel Command	3–4	13
9th Air Force	4	7
Office of the Chief, Chemical Corps	2	0
Chemical Corps School	3	0

Eleven of the fifteen officer personnel from the 1st Rad-Safe Support Unit, including two officers assigned to the Unit from the Chemical Corps School, were permanent for the duration of Operation Teapot. Except for the two officers from the Rad-Safe Branch, DWET, Field Command, AFSWP, and the two officers provided by the Chief, Chemical Corps, all other officers were on a monthly rotational basis. The presence of two officers from the Chemical Corps School who had had experience during a previous operation was arranged for the period 6 February to 15 March 1955 only, but, on request of the Chemical Corps School, they were released earlier.

The Rad-Safe Group was headed by Lt Col Tom D. Collison, Chief, Rad-Safe Branch, Directorate of Weapons Effects Tests, Field Command, AFSWP, Sandia Base, N. Mex. Maj Charles L. Weaver, Commanding Officer, 1st Rad-Safe Support Unit, Fort McClellan, was appointed as Assistant On-site Rad-Safe Officer. The 1st Rad-Safe Support Unit provided the

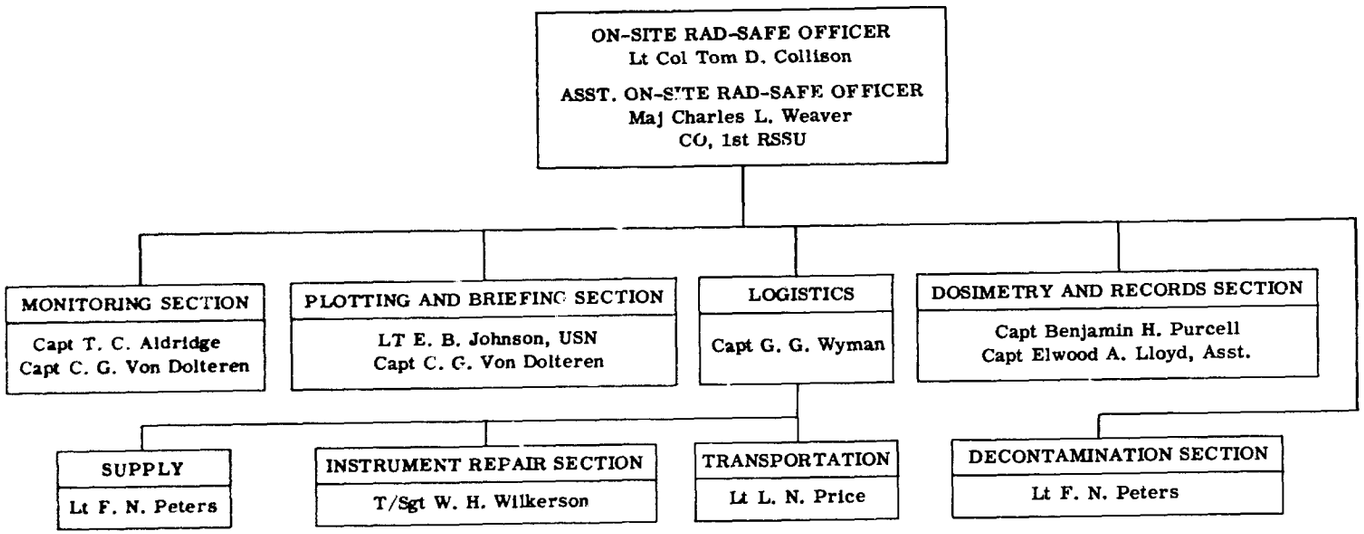


Fig. 1.1—Organization chart for On-site Rad-Safe Group.

basic administrative and functional organization of the group. Organization of the group is shown in Fig. 1.1.

An advance party, consisting of 2 officers, Rad-Safe Branch, DWET, and 3 officers and 20 enlisted men, 1st Rad-Safe Support Unit, arrived at the Nevada Test Site (NTS) on 15 January 1955. The remainder of the personnel of the 1st Rad-Safe Support Unit arrived at NTS on 1 February 1955. All additional augmentation personnel arrived by 7 February 1955.

A chart of the On-site Rad-Safe Group showing the strength fluxation is shown in Fig. 1.2.

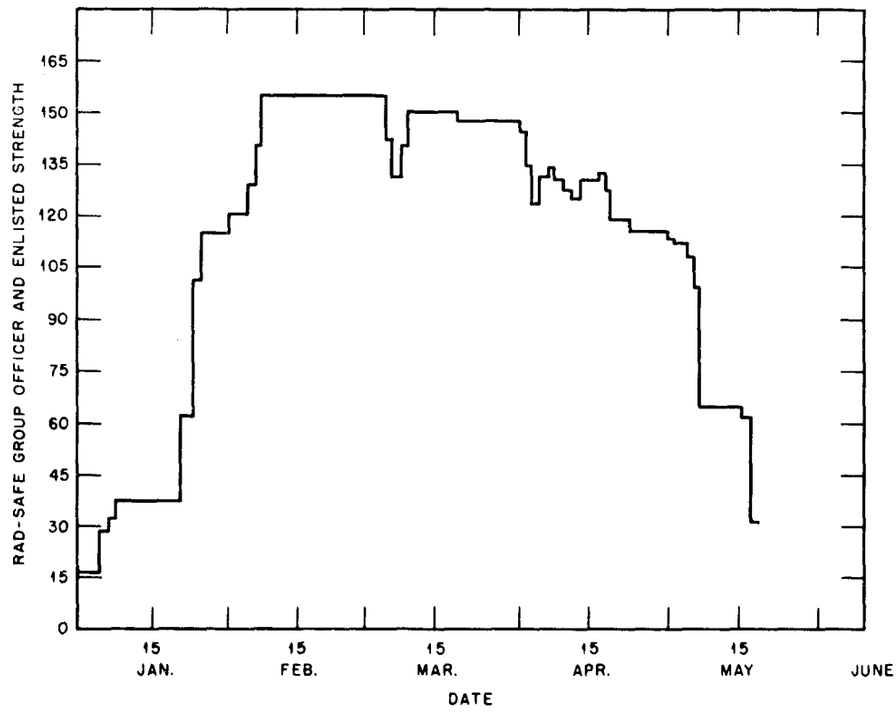


Fig. 1.2—Strength chart for On-site Rad-Safe Group.

1.2 1st RAD-SAFE SUPPORT UNIT

The 1st Rad-Safe Support Unit was organized as a Temporary Duty (T/D) Unit in July 1954. Operation Teapot was the first atomic test operation in which the Unit participated as a complete unit. The mission of the Unit, as outlined in T/D 03-9778-07, was to furnish Rad-Safe support to the Armed Forces Special Weapons Project and the Joint Task Forces for atomic test operations. Training of the Unit personnel commenced 18 October 1954 and was continuous as a result of the rapid turnover of personnel.

1.3 MONITOR TRAINING COURSES

A check of scheduled participation prior to Operation Teapot indicated that as many as 400 monitors would be required for all the agencies and projects participating. A review of general backgrounds indicated that it would be necessary to conduct two general training courses for project monitors, a 4-day course for personnel without previous experience and a

1-day course for personnel who had previous experience in monitoring work. Project officers and agencies were requested to nominate personnel for these two courses. From the number initially enrolled, it was necessary to conduct two 4-day courses and three 1-day courses immediately prior to the start of Operation Teapot. One additional 4-day course and seven 1-day courses were conducted during the operation. Rotated Rad-Safe personnel were also trained in these 1-day courses. A total of 105 persons attended the 4-day courses and 227 attended the 1-day courses.

The curriculums for the 4-day and 1-day courses were as follows:

Four-day Course (32 Hr)

Orientation	1 hr
Structure of matter	1 hr
Radioactivity and absorption of radiation	1½ hr
Shielding and decay	½ hr
Radiation units	1 hr
Medical aspects	2 hr
Handling and shipping radioactive materials	1 hr
Theory of radiac instruments	3 hr
Calibration and maintenance of I-C survey meters; familiarization with G-M survey meters	5 hr
Dosage and time of stay	1 hr
Photodosimetry methods and procedures	2 hr
Pocket dosimeters	2 hr
Miscellaneous films (MF-7896, Basic Physics of the Atomic Bomb; MF-7815, The Effects of Atomic Weapons; EG&G, (house No. 1) and weapons effects discussion	3 hr
Protective clothing and equipment	1 hr
Rad-Safe procedures at NTS	3 hr
Review and critique	4 hr

One-day Course (8 Hr)

Calibration and maintenance of I-C survey meters; familiarization with G-M survey meters	2 hr
Medical aspects	1 hr
Handling and shipping of radioactive materials	½ hr
Protective clothing and equipment	½ hr
Photodosimetry methods and procedures	2 hr
Rad-Safe procedures at NTS	2 hr

After the start of the operation (15 February) students reporting to the 1-day monitor training courses were of such varied background that many minor changes in the 1-day curriculum were made to accommodate the differences in background. Administration and instruction for these courses was handled by officers of the 1st Rad-Safe Support Unit and, for the early courses, by officers attached to the Rad-Safe Group from the Chemical Corps School, Fort McClellan.

1.4 FILM BADGES

It was decided that between 35,000 and 50,000 film badges would be required for the operation. The 502606 film packet used for Operation Upshot-Knothole was to be used. Since a change in the positioning of the lead shield of the badge was necessary, a preliminary batch of 1500 badges was ordered through the Manager, Las Vegas Field Office, in the spring of

1954. It was necessary to repeat this order three times, calling attention each time to errors such as failure to number the badges, failure to locate the lead shield properly, and failure to contain the badge in a proper plastic container; one batch contained only the 502 or low-range film.

Thirty-five thousand badges were ordered and delivered in January 1955. The badges appeared satisfactory. However, it was decided to check them randomly for thickness of lead shield and percentage of accuracy and to examine data on the energy response of the film.

The thickness of the lead shield was found to vary between 25 and 30 mils. Since 28 mils had been specified and approved by the National Bureau of Standards (NBS), a more careful examination was made. It was found that the first 25,000 packets were 28 mils ± 2 mils and the last 10,000 packets were 26 mils ± 2 mils.

The accuracy of the film-badge system, including the deviation of the source (NBS standardization 1.01 rhm ± 10 per cent, 13 July 1954), film, and technique used at NTS, was checked in the following manner: one film packet was taken from each box of 100 through 35,000 badges and was exposed to a known dosage, and the deviation was determined. The data and evaluation are given in Table 1.1.

Table 1.1—FILM-BADGE DATA

No. of films	Span of film Nos.	Dosage, r	Average density	Density deviation: Standard	Density deviation: Standard, %	Density deviation: Single film, maximum	Density deviation: Average, %
166	06650–41450	1.00	0.660	0.027	4.09	15.15	3.03
68	27350–41350	20.00	0.343	0.029	8.40	19.50	6.10
93	06550–26150	47.43	0.733	0.034	4.70	13.30	3.80

Evaluation shows that at	1 r	20 r	47 r
99% of film badges are accurate to	±12%	±25%	±14%
95% of film badges are accurate to	±8%	±17%	±9%
68% of film badges are accurate to	±4%	±8%	±5%

This analysis of Table 1.1 establishes a confidence factor for the particular set of conditions, i.e., film, source, and developing technique. In the most used low-exposure region, 99 per cent of the time the dosage determined is accurate to ±12 per cent. Therefore we have a confidence of 99 per cent that an exposure over 4.4 r (3.9 ± 12 per cent) is over the Test Manager's 3.9-r permissible exposure.

The energy response of the film with lead shields of different thicknesses was verified by tests made by NBS with 31.1-, 28.3-, and 25.6-mil lead shields. Above 300 kv the density difference was negligible. Below 300 kv the 28.3-mil shield overestimates the dosage in the 70- to 95-kv range and underestimates the dosage in the 95- to 300-kv range. The 25.6-mil lead shield consistently overestimates to dosage below 300 kv. The error in estimate with shields of both thicknesses was very small in regions over 200 kv. Lead shields with thicknesses greater than 30 mils were found to significantly underestimate the dosage in the region below 300 kv.

It was decided that the 25,000 correct film packets were satisfactory for the operation and that an additional 10,000 would be ordered about the middle of the operation if the expenditure of badges indicated that this was necessary. After the first month of the operation, the extra badges were ordered. It was also decided that, if it was necessary to use the film packets with the thinner lead shields, a significant correction in the error showed in Table 1.1 would be made by a calibration correction for this set of badges.

1.5 DENSITOMETER FD-1

A newly designed densitometer designated as the "Los Alamos Densitometer FD-1" was procured for the use of the Rad-Safe Dosimetry and Records Section. The basic principle of this densitometer was employed in one designed by Simon Shlaer of Los Alamos and was in use there for approximately two years. The Eberline Instrument Division of Reynolds Electrical and Engineering Company redesigned the instrument for use at NTS.

This densitometer was superior to any previously used at NTS. Some of the advantages are as follows: There is virtually absolute reproducibility regardless of voltage or frequency of power supply. The instrument, although designed to operate at 120 volts 60 cycle, will operate satisfactorily with voltage as low as 90 volts. The area of film read is much greater than any previously read. The area read by the FD-1 is 0.156 sq in. The Macbeth Ansco densitometer previously used at NTS reads an area of approximately 0.012 sq in.

The Los Alamos model FD-1 densitometer is basically a null-balance closed-loop system which compares the light density of an unknown film with a known density and presents the correction necessary to balance the two. A light source and flicker disk provide two equal beams of alternating light which pass through light-absorbing wedges, the film, and into a light-integrating sphere. Beam 1 passes through a zero-adjustment wedge and on into the integrating sphere. Beam 2 enters the area of a neutral-density wedge, in which density varies with angular rotation, and then through the unknown film into the integrating sphere. If there is a difference in intensity of the two beams, it is amplified and fed into a servomotor which drives the neutral-density wedge in the direction which will decrease the difference. As the difference decreases, the counter, which is linked directly to the servomotor, increases by the same amount in density units.

CHAPTER 2

DOSIMETRY DATA AND THE DOSIMETRY AND RECORDS SECTION

2.1 INTRODUCTION

The Dosimetry and Records Section of the On-site Rad-Safe Group consisted of personnel of the 1st Rad-Safe Support Unit plus augmentation officer personnel; the Section reached full operational status on 15 January 1955. The section strength was 2 officers and 19 enlisted men on a permanent basis, plus 2 "augmentation training" officers. The section was organized in three 12-hr shifts with a shift noncommissioned officer (NCO) for each shift and one section NCO. The shifts worked 12 hr on and 24 hr off. The officer personnel were on a similar schedule. One man from each shift was off each day to provide a break in the routine. This system provided one officer, one NCO, and four enlisted men on duty at all times. The individuals were assigned in such a manner as to provide qualified technicians and typists on each shift.

The mission of the Dosimetry and Records Section was to provide dosimetry service and cumulative-dosage records for all test personnel. Briefly this was accomplished by assigning a numbered film badge to an individual on a form that identified a specific badge with an individual. After the badge was worn in a contaminated area, it was returned to the Dosimetry and Records Section for processing. The film was developed and read on a densitometer to determine the net optical density. This net optical density was then converted into a dose that was recorded on the form for later transcription to an individual's cumulative-dosage card. This card became a permanent record of radiation exposure for each individual. A secondary mission was to provide dosimetry services for experimental purposes.

The film badge used was the Du Pont type 559, consisting of two film components: type 502 and type 606. Type 502 has an approximate gamma-ray dosage range of 20 to 10,000 mr. Type 606 has an approximate gamma-ray dosage range of 10,000 to 300,000 mr. The film packet was equipped with a lead shield having a thickness of 0.72 mm, $\frac{1}{2}$ in. wide and 1 in. long, covering both sides, and this was enclosed in a waterproof plastic covering. Each packet was equipped with a double alligator clip for the purpose of fastening the film packet to the individual's clothing.

Preparation of the personnel in this section consisted in assembling experienced personnel and training new personnel. The permanent officer personnel of the Dosimetry and Records Section had had previous experience in dosimetry. Capt Benjamin H. Purcell, of the 1st Rad-Safe Support Unit, had visited the Oak Ridge National Laboratory (ORNL) for dosimetry training and had engaged in special studies at the Chemical Corps School, Fort McClellan. Capt Elwood A. Lloyd, a member of the Chemical Corps School Health Physics Group and Isotopes Committee, had instructed in the radiological branch of the Chemical Corps School for a period of $2\frac{1}{2}$ years and had a 4-week health physics course at ORNL. The enlisted personnel

of the section were selected from the basic training units at Fort McClellan. This resulted in an average educational level of 3 years of college training and a compatible group of men. Several of the men had engaged in photographic work previously. Most of the enlisted personnel received special training at the Chemical Corps School for a period of 2 months prior to the operation. This included all phases of dosimetry work. Immediately prior to the operation, Purcell and Lloyd visited the Los Alamos Scientific Laboratory (LASL) to establish liaison with the dosimetry section there and to accomplish the following: (1) An investigation for the determination of beta dosages was made with the standard film using lead, cadmium, and plastic as absorbers. It was determined that the lead (already on the film badge) was as good as, or better than, the other absorbers for this purpose. (2) A study of the operation and use of the Pee Wee instrument for alpha surveys. (3) A study of the operation and maintenance of the Los Alamos film densitometer FD-1. (4) A determination of the effect of the variation of lead thickness on the film being used. The results of this are described in Chap. 1.

A Standing Operating Procedure for the Dosimetry and Records Section was prepared. This was based on the SOP for Operation Upshot-Knothole. For Operation Teapot procedural changes were made, and the new SOP was published effective 1 February 1955.

The activity of the Co^{60} sources (which were to be used for calibration purposes) was calculated from the NBS calibration data of 13 July 1954, assuming a half life of 5.2 years. The anticipated midpoint of the operation, 13 March 1955, was selected as the date of activity calculation to avoid repeated recalculation and to minimize errors caused by source decay. The error on 13 February 1955 would be +1 per cent, and on 13 April the error would be −1 per cent. The activities of the sources as of 13 March were 49.8 and 925.0 mrhm. The distances to be used on the calibration range for survey instruments were calculated from this data for the larger source for 4, 40, and 400 mr/hr.

The developing equipment, installed in the Rad-Safe Building for Operation Buster-Jangle, was checked by William E. De Alva of Los Alamos (where the equipment was originally designed and built). This was necessary since the equipment had been moved from Camp Mercury to the Rad-Safe Building and installed by workmen who were not fully familiar with the equipment. Several adjustments and corrections were made by De Alva.

The pocket dosimeters to be used during the operation were checked by making leakage tests and calibrations (correction factors) for each dosimeter. Initially, there were on hand 610 dosimeters with a range of 0 to 200 mr, 717 with a range of 0 to 1 r, 373 with a range of 0 to 5 r, and 60 with a range of 0 to 10 r. Other dosimeters were tested and calibrated during the operation.

Prior to the operation over 300 films were used to calibrate the film badges against both the 49.8 and 925.0 mrhm Co^{60} sources. The dosage was plotted on linear paper against net optical density for both the Los Alamos and the Macbeth Ansco densitometers. This curve was then tabulated to prevent possible graphical error. Calibration checks were made with each batch of film developed during the operation. A confidence level on the film badge was also determined. This is described in Chap. 1.

The interim period cut-off date was established as 13 February 1955. All film received and developed after that date was recorded as operational film and charged to Operation Teapot. All film developed prior to 13 February 1955 was recorded as the interim period dosage. The final interim period report was prepared as of 2400 hr, 12 February 1955, and was forwarded to the Field Manager, Las Vegas Field Office, 16 February 1955.

Many organizations were issued badges in bulk lots and given the responsibility for individual issue and return. Basic records were maintained by the Rad-Safe Dosimetry and Records Section. This type issue was made to Indian Springs AFB, Off-site Rad-Safe groups, and various operational training groups. Indian Springs AFB was supplied with approximately 500 film badges per month, including the developing, reading, and recording. Records were kept by both the Indian Springs Rad-Safe Group and by this organization. Off-site Rad-Safe used approximately 600 films per week. Under the operational training programs, participating Tactical and Strategic Air Command bases throughout the United States requested and were furnished with 1764 film badges, 116 dosimeters with a range of 0 to 1 r, and 13 detector chargers.

At various intervals, based on the shot schedule, the Dosimetry and Records Section submitted periodic activities reports, which showed the quantity of dosage devices processed each day, the number of persons whose dosage had exceeded a cumulative dosage of 2.0 r (but less than 3.9 r), the number of persons whose dosage exceeded 3.9 r, and other pertinent remarks. These dosages were reported to the various projects by telephone as soon as the badges were evaluated. A cumulative-dosage report was forwarded each Monday, giving names and dosages of all persons in the 2.0- to 3.9-r zone. Exposures greater than 3.9 r were reported by separate correspondence to the individual program.

Upon the completion of the operation the dosimetry records were extracted, and a cumulative-dosage report for each individual was prepared and forwarded to the individual's home organization. A complete report of the cumulative dosages received by all test participants was prepared and forwarded to the Test Manager and the Division of Biology and Medicine, USAEC, and the Chief, AFSWP. This report was broken down into DOD and non-DOD personnel. The original records and film for DOD personnel were forwarded to Chief, AFSWP, and all other original records and film were forwarded to the Manager, Las Vegas Field Office.

2.2 PERIODIC ACTIVITIES

The following activities reports for each shot period contain brief records of significant happenings and routine work of the Dosimetry Data and Records Section. The period covered by any single report terminates at 2400 hr on D−2 day of the succeeding shot. This cut-off date was established so that any single report would reflect the work performed as accurately as possible, including preparations for any single shot. The starting date for dosage records was 13 February 1955. All exposures prior to that date were consolidated for the interim period and forwarded to the Manager, Las Vegas Field Office.

2.2.1 Shot Wasp

During the period 0001 hr, 13 February, through 2400 hr, 20 February 1955, which included shot Wasp on 18 February, personnel exposure records indicate that one person accumulated a total dosage greater than 2.0 r but less than 3.9 r, and one person accumulated a dosage greater than 3.9 r, resulting in a total of one person with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

	Film badges								
Date	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20	Total
Issued	95	129	667	36	82	185	151	28	1373
Received	13	34	15	6	22	182	144	28	444
Developed	13	34	15	6	22	182	144	28	444
Read	13	34	15	6	22	182	144	28	444
Recorded	13	34	2	6	12	182	144	28	421
	Dosimeters								
Issued	17	25	0	0	0	145	137	23	347
Received	3	0	0	0	0	144	130	23	300

Remarks. (1) To provide a beta-dosage wrist-badge service, the film badge used for gamma dosage was calibrated against a natural-uranium source furnished by UCRL, the agency that had requested wrist-badge service. (2) The Chemical Section of Camp Desert Rock was assisted in calibrating a cobalt source which was to be used for film calibration.

2.2.2 Shot Moth

During the period 0001 hr, 21 February, through 2400 hr, 27 February 1955, which included shot Moth on 22 February, personnel exposure records indicate that 12 persons ac-

cumulated a total dosage greater than 2.0 r but less than 3.9 r, and 1 person accumulated a dosage of 3.9 r or more, resulting in a cumulative total of 2 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	2/21	2/22	2/23	2/24	2/25	2/26	2/27	Total
Issued	100	185	248	88	65	46	16	748
Received	81	163	194	70	66	84	5	663
Developed	81	244	269	173	636	424	5	1832
Read	81	244	269	173	0	424	5	1196
Recorded	81	163	194	70	54	86	5	653
				Dosimeters				
Issued	32	115	165	46	40	11	7	416
Received	31	102	143	44	32	11	5	368

Remarks. (1) On 24 February 1955, this section exposed film for a calibration experiment for L. J. Deal of the Civil Effects Test Group to determine the range of Edgerton, Germeshausen and Grier (EG&G) and British film badges in comparison with the Rad-Safe badge. (2) On 25 February 1955, this section exposed and developed film for Camp Desert Rock calibration data.

2.2.3 Shot Tesla

During the period 0001 hr, 28 February, through 2400 hr, 5 March 1955, which included shot Tesla on 1 March, personnel exposure records indicate that 11 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and 10 persons accumulated a dosage of 3.9 r or more, resulting in a cumulative total of 12 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	2/28	3/1	3/2	3/3	3/4	3/5	Total
Issued	198	225	87	45	45	14	614
Received	353	311	174	195	159	22	1214
Developed	353	470	174	195	159	26	1377
Read	353	332	174	195	159	26	1239
Recorded	300	241	117	195	159	26	1136
			Dosimeters				
Issued	73	198	48	45	0	6	570
Received	31	169	68	32	5	10	315

Remarks. On 1 March 1955, a Federal services employee (Security Guard) received a dosage of 39 r. Security sent a man into the test area at about H+5 min without coordinating with Rad-Safe and without requesting a monitor.

2.2.4 Shot Turk

During the period 0001 hr, 6 March, through 2400 hr, 10 March 1955, which included shot Turk on 7 March, personnel exposure records indicate that 14 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and 4 persons accumulated a dosage of 3.9 r or more, resulting in a cumulative total of 16 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	3/6	3/7	3/8	3/9	3/10	Total
Issued	15	447	250	129	574	1515
Received	12	255	400	1007	128	1802
Developed	11	322	526	1007	128	1994
Read	11	322	526	1007	128	1994
Recorded	11	62	526	1007	128	1834

Dosimeters

Issued	5	154	150	101	86	496
Received	3	119	175	98	33	428

Remarks. (1) On 7 March 1955, the instrument calibration range was modified and improved. (2) As a result of a question relating to the validity of Co^{60} as a source for the calibration of film badges, two test runs were made on 10 March 1955, for comparison between Co^{60} and radium as a standard source. There is close agreement between the density of the two curves up to an exposure of approximately 1 r. At 1 r the curves begin to diverge and reach a maximum difference of approximately 25 per cent at an exposure of 10 r. For example, a net optical density of 2.55 would correspond to a dosage of 10 r on the Co^{60} calibration curve as compared with a dosage of 7.5 r on the radium calibration curve. At approximately 20 r the curves converge and agree closely again up through 100 r. At 100 r the curves diverge again but in the opposite direction. For example, a net optical density of 3.93 would correspond to a dosage of 300 r on the radium calibration curve as compared to a dosage of 255 r on the Co^{60} calibration curve. The curves are shown in Fig. 2.1.

2.2.5 Shot Hornet

During the period 0001 hr, 11 March, through 2400 hr, 20 March 1955, which included shot Hornet on 12 March, personnel exposure records indicate that 24 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and 3 persons accumulated a dosage of 3.9 r or more, resulting in a cumulative total of 19 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

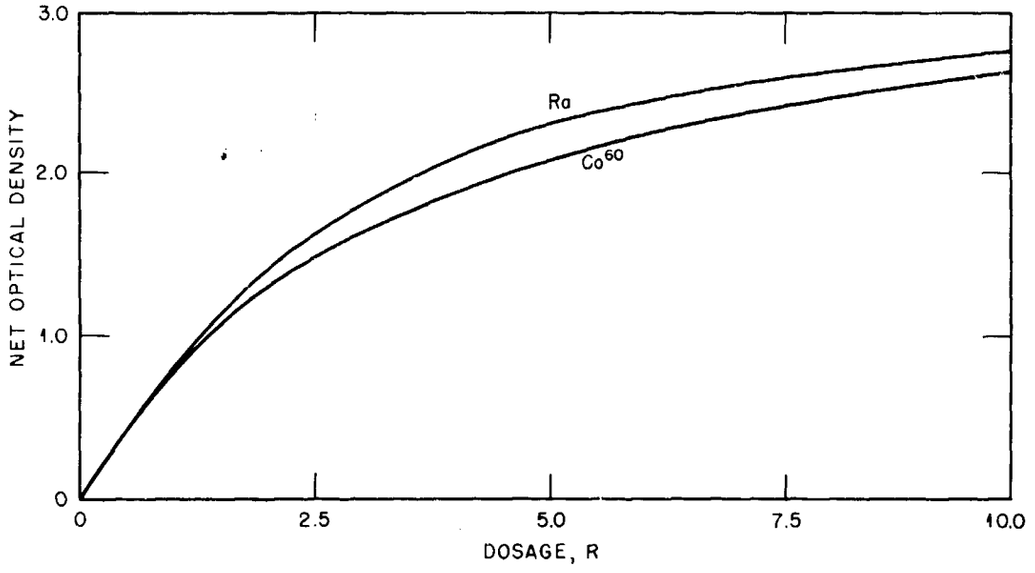
Film badges

Date	3/11	3/12	3/13	3/14	3/15	3/16	3/17	3/18	3/19	3/20	Total
Issued	44	335	61	78	868	63	119	41	171	14	1794
Received	142	274	121	37	657	65	16	21	43	13	1389
Developed	142	364	121	185	741	112	97	56	85	29	1932
Read	142	364	121	185	741	112	65	55	85	29	1899
Recorded	142	364	113	185	241	104	65	55	81	25	1375

Dosimeters

Issued	26	111	43	71	56	53	62	24	45	5	496
Received	34	174	58	24	22	55	16	13	36	7	439

Remarks. (1) On 14 March 1955, the monthly records inspection of the Dosimetry and Records Section was started. A few minor discrepancies were noted and corrected. Duplicate individual record cards were found in two instances, and two dosages were found that were not recorded. (2) On 15 March 1955, a check of the still that produced distilled water for developing solution indicated that it was not functioning properly. This was repaired.



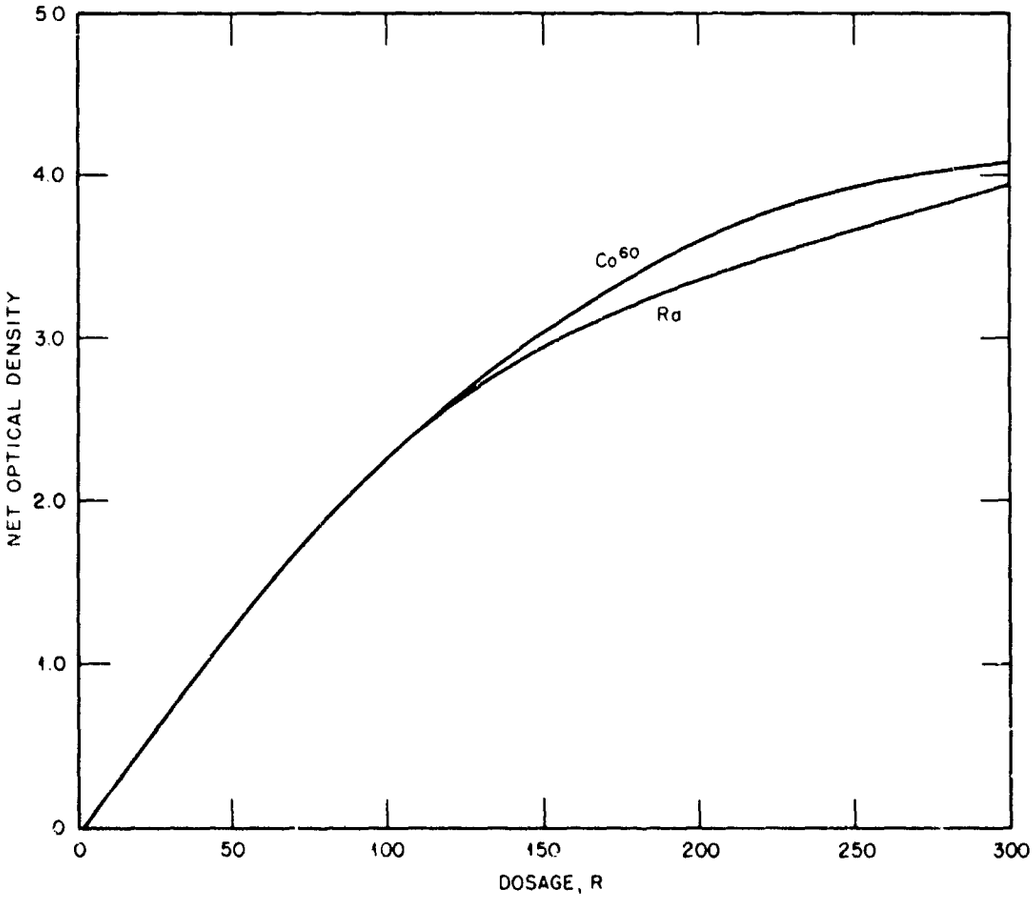


Fig. 2.1 — Test calibration curves for radium vs Co^{60}.

2.2.6 Shot Bee

During the period 0001 hr, 21 March, through 2400 hr, 22 March 1955, which included shot Bee, personnel exposure records indicate that 13 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and no one accumulated a dosage of 3.9 r or more, resulting in a cumulative total of 19 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	3/21	3/22	Total
Issued	72	166	238
Received	98	449	547
Developed	108	459	567
Read	108	459	567
Recorded	108	390	498

Dosimeters

Issued	46	124	170
Received	57	77	134

2.2.7 Shot Ess

During the period 0001 hr, 23 March, through 2400 hr, 27 March 1955, which included shot Ess, personnel exposure records indicate that 34 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and 3 persons accumulated a dosage of 3.9 r or more, resulting in a cumulative total of 22 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	3/23	3/24	3/25	3/26	3/27	Total
Issued	152	230	140	296	53	871
Received	43	319	380	158	141	1041
Developed	142	477	380	165	149	1316
Read	86	477	380	168	149	1220
Recorded	86	477	380	156	149	1208

Dosimeters

Issued	142	106	85	121	37	471
Received	51	148	55	35	49	318

2.2.8 Shots Apple and Wasp'

During the period 0001 hr, 28 March, through 2400 hr, 4 April 1955, which included shots Apple and Wasp', personnel exposure records indicate that 52 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and 10 persons accumulated a dosage of 3.9 r or more, resulting in a cumulative total of 32 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	3/28	3/29	3/30	3/31	4/1	4/2	4/3	4/4	Total
Issued	147	701	794	120	72	43	50	640	2562
Received	164	647	1110	299	166	116	77	617	3196
Developed	176	704	1130	393	178	162	81	617	3441
Read	176	664	1130	393	178	162	81	617	3401
Recorded	176	664	605	156	178	124	81	75	2059
Dosimeters									
Issued	57	235	87	76	34	41	25	35	590
Received	26	262	71	22	82	66	12	10	551

2.2.9 Shot HA

During the period 0001 hr, 5 April, through 2400 hr, 7 April 1955, which included shot HA, personnel exposure records indicate that 10 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and 1 person accumulated a dosage of 3.9 r or more, resulting in a cumulative total of 33 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	4/5	4/6	4/7	Total
Issued	83	453	575	1111
Received	131	244	40	415
Developed	351	277	256	884
Read	138	277	250	665
Recorded	138	244	250	632
Dosimeters				
Issued	22	48	102	172
Received	13	19	10	42

2.2.10 Shot Post

During the period 0001 hr, 8 April, through 2400 hr, 13 April 1955, which included shot Post, personnel exposure records indicate that 12 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and no one accumulated a total dosage greater than 3.9 r, resulting in a cumulative total of 33 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	4/8	4/9	4/10	4/11	4/12	4/13	Total
Issued	30	290	17	132	23	100	592
Received	56	281	105	397	77	122	1038
Developed	60	309	117	397	164	250	1297
Read	60	309	117	397	84	250	1217
Recorded	56	281	117	397	82	122	1055
Dosimeters							
Issued	11	63	9	28	4	31	146
Received	23	51	1	116	7	6	204

Remarks. During this period a Reynolds work crew, building a tower in Area 7-1a, turned in a set of film badges which read 7 to 12 r. Upon investigation it was found that these badges had been inadvertently left in Area 7-1a from Friday evening, 8 April, until Monday morning, 11 April. During this period shot Post was fired, contaminating this area to a level of 2 r/hr as measured 1 hr after the detonation. The personnel concerned were credited with adjusted dosage as obtained from the badges of other personnel doing similar work during the same period in the same area, and the Reynolds foremen and crews were lectured on Rad-Safe procedures.

2.2.11 Shot Met

During the period 0001 hr, 14 April, through 2400 hr, 3 May 1955, which included shot Met, personnel exposure records indicate that 55 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and 11 persons accumulated a total dosage greater than 3.9 r, resulting in a cumulative total of 44 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	4/14	4/15	4/16	4/17	4/18	4/19	4/20	4/21	4/22	4/23	4/24
Issued	78	114	117	49	130	190	111	104	130	31	83
Received	289	622	414	80	375	960	246	248	130	121	154
Developed	345	662	600	324	509	394	965	399	140	121	164
Read	289	662	600	84	375	292	728	399	140	121	164
Recorded	289	622	600	84	375	292	728	399	140	84	94

Dosimeters

Issued	57	14	66	49	97	28	16	36	34	20	40
Received	37	50	39	52	23	13	38	32	12	7	7

Film badges

Date	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2	5/3	Total
Issued	72	135	89	56	16	16	9	22	52	1604
Received	112	70	50	631	73	12	12	70	112	4781
Developed	118	76	94	791	73	151	42	100	116	6184
Read	118	76	54	631	73	151	16	100	116	5189
Recorded	118	70	50	631	73	104	16	32	116	5027

Dosimeters

Issued	8	107	35	46	2	6	2	6	27	796
Received	0	17	22	1	12	7	0	8	39	436

Remarks. (1) On D-day (15 April) a mobile Dosimetry Unit was established at the main access road to Frenchman Flat to issue and receive dosage devices used in the Frenchman Flat area. Most of the devices used on 15 through 21 April were issued and received by this mobile unit. (2) On 16 April a new shipment of film (emulsion No. 559-705) was received and calibrated. This film was placed in use on 18 April 1955.

2.2.12 Shot Apple II

During the period 0001 hr, 4 May, through 2400 hr, 9 May 1955, which included shot Apple II, personnel exposure records indicate that 42 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and 12 persons accumulated a total dosage greater than 3.9 r, resulting in a cumulative total of 56 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	5/4	5/5	5/6	5/7	5/8	5/9	Total
Issued	156	388	203	70	11	66	894
Received	245	639	349	238	23	125	1619
Developed	250	659	366	322	28	134	1759
Read	250	659	366	244	28	134	1681
Recorded	250	659	366	244	28	125	1672

Dosimeters

Issued	37	372	104	32	10	25	580
Received	24	298	87	27	2	41	479

2.2.13 Shot Zucchini

During the period 0001 hr, 10 May, through 2400 hr, 16 May 1955, which included shot Zucchini on 15 May, personnel exposure records indicate that 16 persons accumulated a total dosage greater than 2.0 r but less than 3.9 r, and no one accumulated a total dosage greater than 3.9 r, resulting in a cumulative total of 56 persons with a dosage in excess of the permissible exposure for Operation Teapot.

During this period the Dosimetry and Records Section performed the following work:

Film badges

Date	5/10	5/11	5/12	5/13	5/14	5/15	5/16	Total
Issued	42	75	15	14	6	35	35	222
Received	183	100	148	25	81	192	658	1387
Developed	189	131	154	25	81	200	658	1438
Read	189	131	154	25	81	200	658	1438
Recorded	189	79	154	19	16	200	234	891

Dosimeters

Issued	31	58	12	11	2	33	20	167
Received	25	57	13	4	3	13	0	115

Remarks. (1) During this period a list was made of all personnel on whom the Section had incomplete information as to permanent organization addresses. To obtain complete information the Test Organization Security files and personnel files at the DOD Support Division and Indian Springs AFB were checked. In addition, various test projects and organizations were contacted. (2) Dosimeters not needed during the interim period were turned in to the Supply Section.

2.3 SUMMARY

Approximately 30,000 film packets were used (issued and processed) by the Dosimetry and Records Section during Operation Teapot. The distribution of this film was as follows:

Off-site Rad-Safe	8,000
TAC and SAC Air Bases	1,764
Indian Springs AFB	1,500
On-site recoveries and surveys	15,000
Experimental (by projects)	2,500
Calibration and experimental (D&R)	1,500
Total	30,264

Exposure records indicate that a total of 56 persons received a cumulative dosage greater than 3.9 r. This is 0.5 per cent of those participating in Operation Teapot. These exposures over 3.9 r are distributed as shown below:

Between 3.9 and 4.4	28
Between 4.4 and 6.5	19
Between 6.5 and 12.5	6
Between 12.5 and 19.3	2
39	1
Total	56

Recommendations. (1) Liaison with H-Division, LASL, should again be established by officer personnel of the Dosimetry and Records Section. This will facilitate rapid solution of many problems which might arise.

(2) A radium source of approximately 500 mrhm should be procured for use at NTS for calibration of film badges. The Co^{60} sources used were of a strength such that the two sources (50 mc and 900 mc) were needed to run a calibration curve from 0 to 300 r. This resulted in a slight discontinuity. Radium also has a more appropriate energy distribution.

(3) The darkroom equipment should be duplicated by similar equipment in the Mercury area for use during the interim period, rather than move the present equipment from the Rad-Safe Building. This would prevent the damage that invariably results when this equipment is moved to and from Camp Mercury. It would also provide a back-up in the event of equipment failure at the Rad-Safe Building. Equipment with a smaller capacity would be satisfactory and would cost less than a single move of the present equipment.

(4) The system established during this operation for the receipt of dosimeters and film badges by the Forward Area check point should not be used in the future. This service was little used by participating personnel and did cause several problems.

(5) For future test operations it is recommended that a film badge consisting of the Du Pont 502, 510, and 606 films be used. This combination will give a better coverage in the 1- to 50-r range.

CHAPTER 3

SURVEY DATA AND THE PLOTTING AND BRIEFING SECTION

3.1 INTRODUCTION

The purpose of the Plotting and Briefing Section was to act as a Rad-Safe control point and information center for test participants. To accomplish this, the section was organized to fulfill the following functions.

1. Advise the Test Director, J-3, concerning the radiological aspects of test recoveries in contaminated areas.
2. Plan with the Monitoring Section the survey requirements for each shot based on recovery requirements. This included briefing initial survey teams, making special surveys of designated stations, including a helicopter survey of known high-intensity areas, and acting as a radio control center for the survey teams while they were in the field.
3. Permanently record all survey data and prepare isointensity situation maps showing the 10 and 1 r/hr and the 100 and 10 mr/hr lines.
4. Plan with the Monitoring Section the location of all check points and signs.
5. Act as a center for Rad-Safe control, brief all recovery party leaders and monitors on the current radiological situation, and, after checking to see that the personnel are properly equipped and instructed, issue an access permit for contaminated areas.
6. Furnish the Dosimetry and Records Section with the names of personnel on recovery parties so that assignment of film badges and equipment could be made in advance.
7. Indicate to the Monitoring Section the position and extent of required stake lines.
8. Furnish all required maps.

The Section was organized 1 February 1955 and carried out extensive training until the first shot on 18 February 1955. It was composed of three officers and eight enlisted personnel. Except for two of the officers, the personnel were from the 1st Rad-Safe Support Unit. Key personnel were LT E. B. Johnson, USN, Field Command, AFSWP, Plotting and Briefing Officer, and Capt C. G. Von Dolteren, Signal Corps, 1st Rad-Safe Support Unit.

Approximately eight radial stake lines around Ground Zero were used to aid survey teams in locating their position and to facilitate plotting of data for the radiological-situation maps. The ideal situation would require the stakes to extend in straight lines radially from Ground Zero at 45° intervals. However, owing to the rough terrain and the necessity to get data in early to facilitate recovery, the stake lines were established along existing roads. Therefore the stake lines for each area vary from seven to ten and were not necessarily placed in straight lines to Ground Zero.

The following numbering system was adopted to aid the monitor and plotter: Each stake was given a three-digit number to identify it. The first digit indicated the stake line, i.e., stake line 1 was located approximately 45° from the north, stake line 2 was approximately 90° from the north, etc. The last two digits indicated the approximate distance along the stake

line from Ground Zero in hundreds of yards. The distance indicated does not necessarily correspond to the exact distance from Ground Zero, except for those particular stake lines that are in a straight line from Ground Zero.

Figure 3.1 is a test site layout of the Yucca Flat area.

The survey data, plots of these data, and particular comments on each shot are contained in the sections following. Survey data are indicated, where possible, by a specific numbered stake. The location for station readings and lettered check points in the areas can be found on the map of the Yucca Flat area in Appendix A.

3.2 SHOT WASP

On 2 February 1955, the Plotting and Briefing Section started planning and training for shot Wasp. The device was dropped on the fourth attempt at 1200 hr, 18 February 1955 in Area 7-4. The survey parties, after briefing, were dispatched from the Rad-Safe Building at 1202 hr to begin the survey of Area 7-4. The survey team was detained in error at the security check point, Gate 4, until 1231 hr. The survey team made contact with the 10 mr/hr line at 1248 hr and completed the survey at 1315 hr. R-hour was declared at 1335 hr.

Although the helicopter team cleared adjacent areas, it could not take accurate readings at station locations because of high winds which kept the probe of the instrument from making contact with the ground.

Projects 2.2 and 39.7 were authorized to enter the contaminated area prior to R-hour at 1231 hr by the Test Director. Entry to contaminated areas above 10 r/hr was granted by the Test Director to these two projects. Project 13.1 was released for entry beyond the 10 r/hr line by the On-site Rad-Safe Officer. On 19 February, 21 parties from 10 projects were briefed on the radiological situation and were dispatched in accordance with the Test Director's schedule of events.

Resurveys of the contaminated area were conducted at 1700 hr on D-day and at 1000 hr on 19 February 1955. By 0800, 21 February, the Ground Zero reading of 28 r/hr had decayed to 360 mr/hr.

The following parties were briefed for entry into the Wasp area: on 19 February, 18 parties; on 20 February, 1 party; on 21 February, 3 parties; and on 22 February, 4 parties.

Survey data are shown in Tables 3.1 to 3.3. Isointensity plots are shown in Figs. 3.2 to 3.4. Stake line numbers indicated are true distances from Ground Zero for these data.

3.3 SHOT MOTH

On shot Moth, 0545 hr, 22 February 1955, Area T-3, the survey party was given a final briefing at 0515 hr on D-day. At H+2 min the survey party left the Rad-Safe Building. The survey started at 0611 and was completed at 0813 hr. The helicopter survey party departed at H+8 min and completed its survey at 0657 hr. The helicopter survey was not successful because of poor communications and a low-hanging fog.

Although the survey was not completed, R-hour was recommended by the On-site Rad-Safe Officer and declared by the Test Director at 0711 hr. From 0711 until 1800 hr, 22 parties from 11 projects were briefed for entry into the Moth area and four parties for entry into Area 7. Five parties of Project 39.7 and two parties of Project 2.2 were permitted to enter the contaminated area prior to R-hour and were also permitted to pass the 10 r/hr line. The following parties were admitted to the area on the specified dates: 23 February, 12 parties; 24 February, 8 parties; 25 February, 1 party; and 28 February, 28 parties.

Survey data are shown in Tables 3.4 to 3.6. Isointensity plots are shown in Figs. 3.5 to 3.10. (Text continues on page 45.)

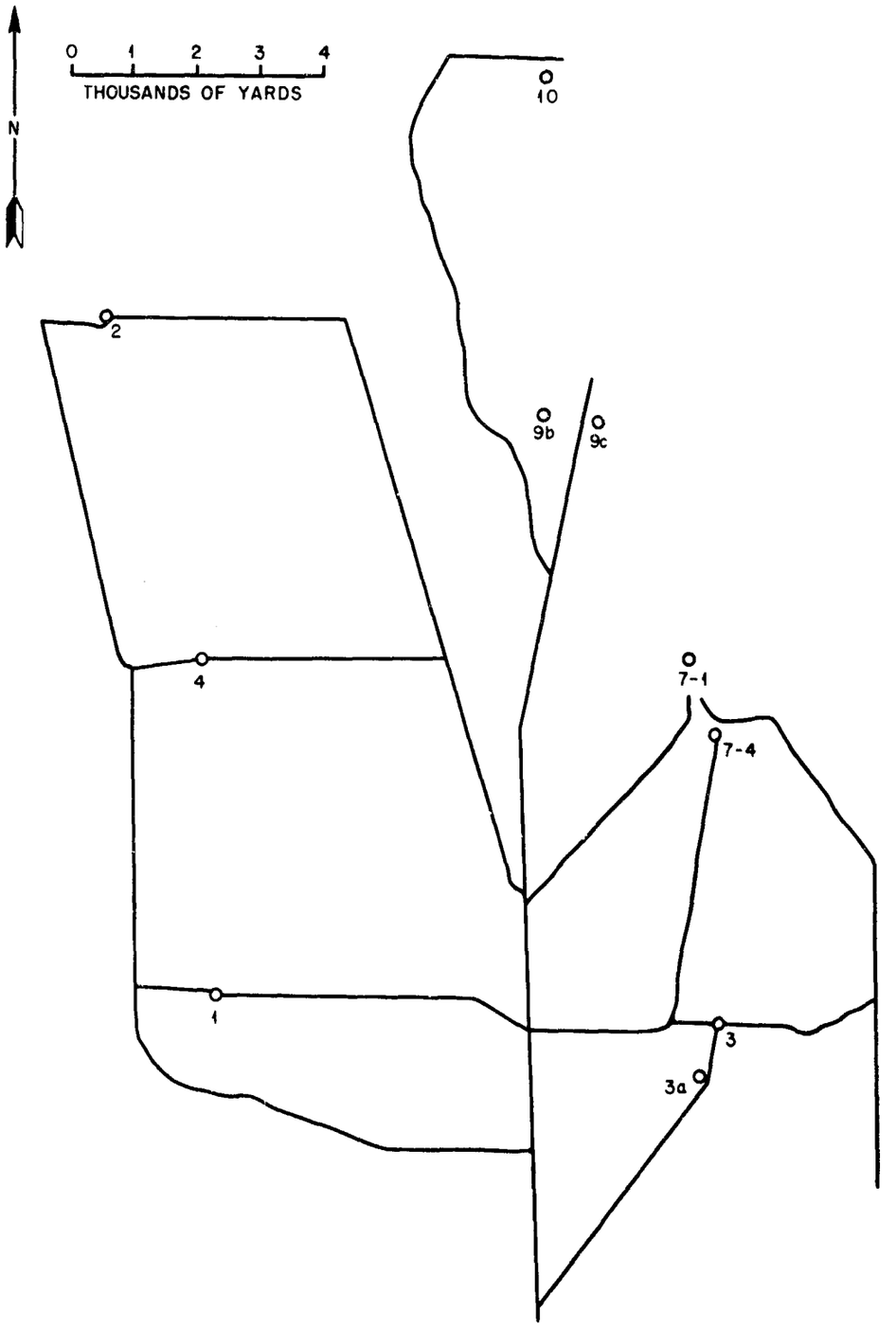


Fig. 3.1—Yucca Flat test area.

Table 3.1—RESULTS OF SURVEYS, WASP

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey, 18 February 1955			
213.6*	10	1307	510.0	10	1247
208.3	100	1305	509.0	100	1257
203.0	1,000	1249	508.0	1,000	1257
201.0	10,000	1250	502.5	10,000	1255
101.3	10,000	1251	603.0	10,000	1258
104.8	1,000	1254	607.0	1,000	1300
110.0	100	1255	606.0	100	1302
113.6	10	1300	608.0	10	1304
310.0	100	1248	711.3	10	1248
306.5	100	1250	707.8	100	1251
312.3	1,000	1251	704.3	1,000	1253
301.7	10,000	1252	702.5	10,000	1250
413.6	10	1256	801.5	10,000	1310
408.3	100	1254	804.8	1,000	1312
411.8	1,000	1252	810.0	100	1314
401.8	10,000	1251	816.0	10	1315
		Resurvey 1, 18 February 1955			
206.5	100	1635	511.8	10	1638
210.0	10	1636	508.3	100	1635
202.7	1,000	1638	503.0	1,000	1633
200.5	10,000	1641	502.0	10,000	1630
100.5	10,000	1642	603.0	10,000	1642
104.8	1,000	1644	606.5	1,000	1644
108.6	100	1646	610.0	100	1646
113.9	10	1648	611.8	10	1648
311.8	10	1632	712.6	10	1632
306.5	100	1635	710.8	100	1635
303.0	1,000	1637	707.3	1,000	1638
300.5	10,000	1640	702.0	10,000	1640
413.6	10	1642	801.2	10,000	1644
408.3	100	1645	804.3	1,000	1646
404.8	1,000	1647	808.3	100	1648
400.5	10,000	1649	813.6	10	1651
		Resurvey 2, 19 February 1955			
208.3	10	0958	510.0	10	0944
204.8	100	0956	506.5	100	0956
201.6	1,000	1000	503.0	1,000	0958
200.0	4,000	1002	GZ	4,000	1000
100.0	4,000	1002	GZ	4,000	1000
101.7	1,000	1003	604.8	1,000	1007
104.8	100	1005	606.5	100	1009
108.3	10	1007	610.0	10	1010
308.3	10	0958	710.0	10	0955
304.8	100	1000	706.5	100	0957
302.3	1,000	1002	703.0	1,000	1000
GZ	4,000	1004	GZ	4,000	1002
GZ	4,000	1006	GZ	4,000	1002
404.8	1,000	1008	802.5	1,000	1004
406.5	100	1010	806.5	100	1005
410.0	10	1012	810.0	10	1010

*1360 yd from Ground Zero along stake line 2.

Table 3.2—HELICOPTER DATA, WASP*

Location	Intensity (T1B), mr/hr†	Probe intensity, mr/hr	Altitude above terrain, ft	Time	Computed ground reading,‡ mr/hr
Intended GZ	50,000		500	1210	600,000
Intended GZ	5,000		500	1240	60,000
Intended GZ	3,500		500	1300	42,000
100 yd S intended GZ		50,000	100	1300	
150 yd N Bunker 7-300	3,600		275	1320	16,200
50 yd N Bunker 7-300		20,000	Surface	1320	

* Time as indicated, 18 February 1955, H-hour, 1200.

† T1B was on floor of cabin in H-19 helicopter and the probe was approximately 3 ft above terrain.

‡ Computed ground reading taken from "Correlation Curves for Air to Ground Readings," 3 April 1953, Operation Upshot-Knothole Rad-Safe Report WT-817, Chap. 14.

Table 3.5—MISCELLANEOUS GROUND READINGS, WASP

Location	Intensity, mr/hr	Time	Date
Intended GZ	28,000	1244	2/18/55
F. Flat	11	1235	2/18/55
F. Flat	1.5	1245	2/18/55
Sta. 7-300	25,000	1256	2/18/55
Area 9	0	1402	2/18/55
Area 3	3.0	1415	2/18/55
Area 3a	3.5	1224	2/18/55
1000 ft from intended GZ on a bearing of 225°	4,500	1515	2/18/55
Area 10	0	1417	2/18/55
Sta. 7-300	360	0800	2/21/55
GZ	400	0800	2/21/55
Sta. 7-300	140	1325	2/22/55
GZ	160	1330	2/22/55
GZ	70	0800	2/23/55
Bunker 7-300	20	0820	2/24/55
Stake 502 + 50 yd	10	0820	2/24/55
Stake 401 + 50 yd	10	0820	2/24/55
80 yd from GZ along stake line 3	10	0820	2/24/55
75 yd from GZ along stake line 2	10	0820	2/24/55
50 yd from GZ along stake line 1	10	0820	2/24/55
Stake 801 + 50 yd	10	0820	2/24/55
290 yd from GZ along stake line 7	10	0820	2/24/55
Stake 604	10	0820	2/24/55
GZ	20	0820	2/24/55
Stake 601 + 50 yd	30	0820	2/24/55

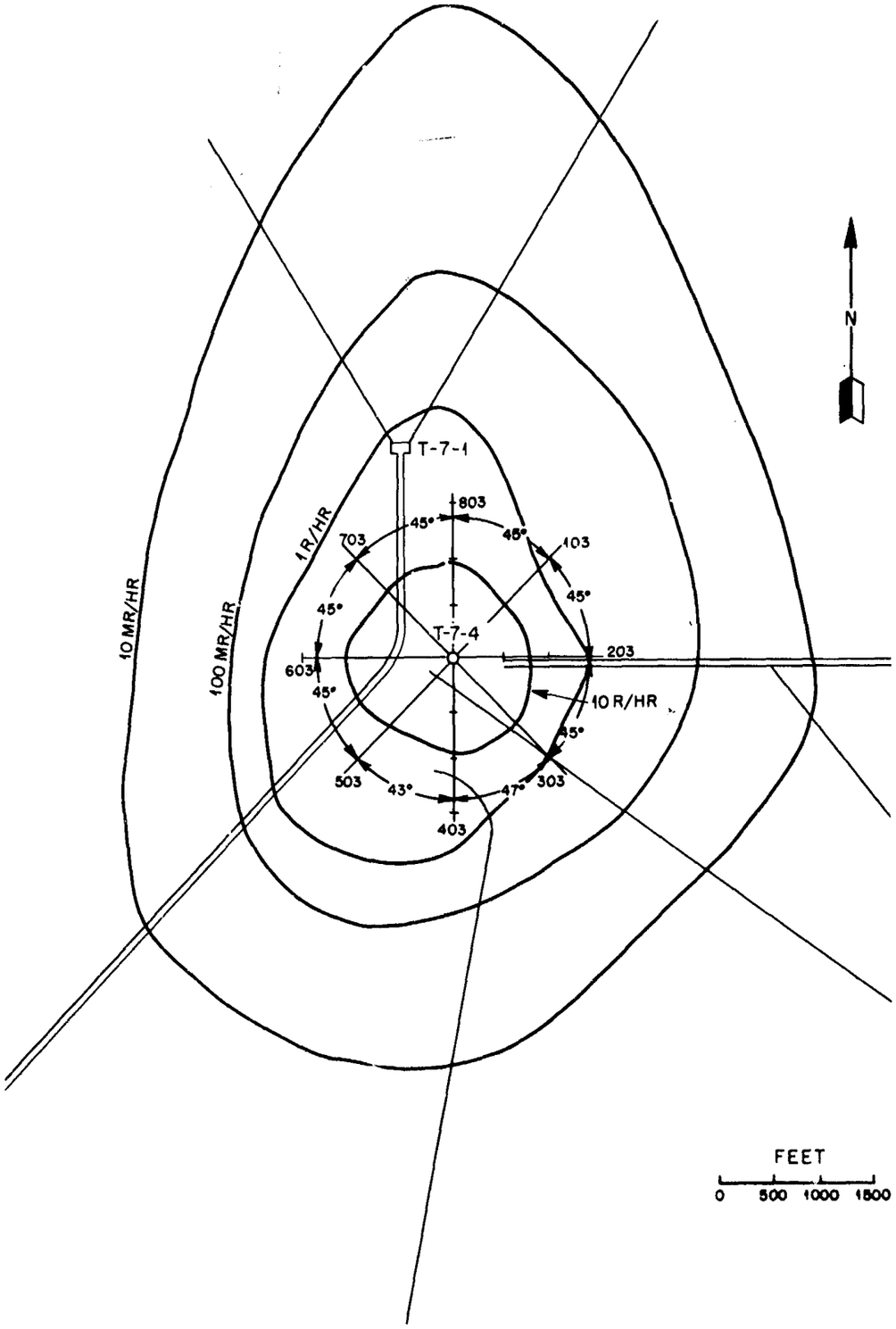


Fig. 3.2—Initial survey, Wasp. Area, T-7-4; date, 18 February 1955; survey time, 1248 to 1315 hr.

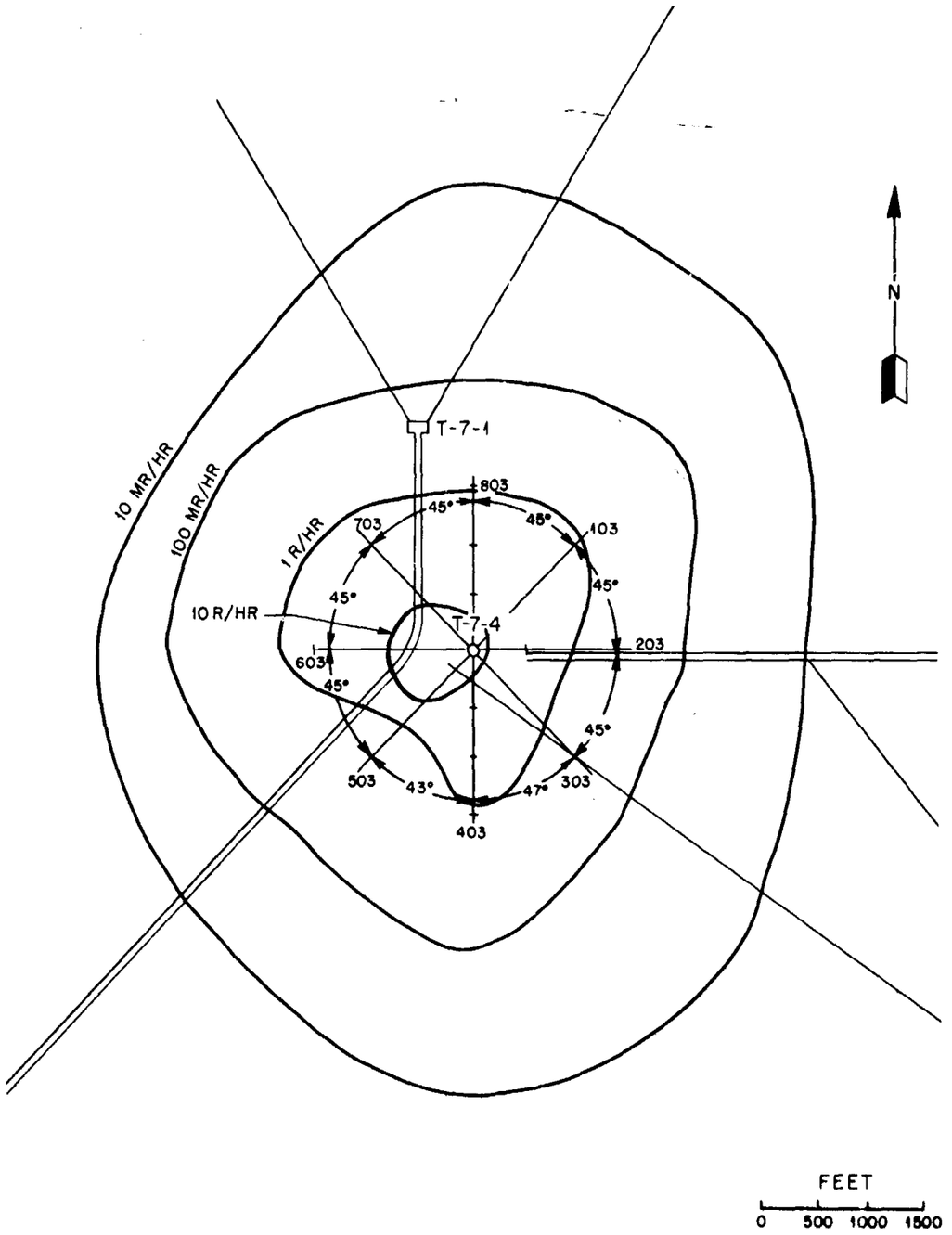


Fig. 3.3—Resurvey 1, Wasp. Area, T-7-4; date, 18 February 1955; survey time, 1650 to 1702 hr.

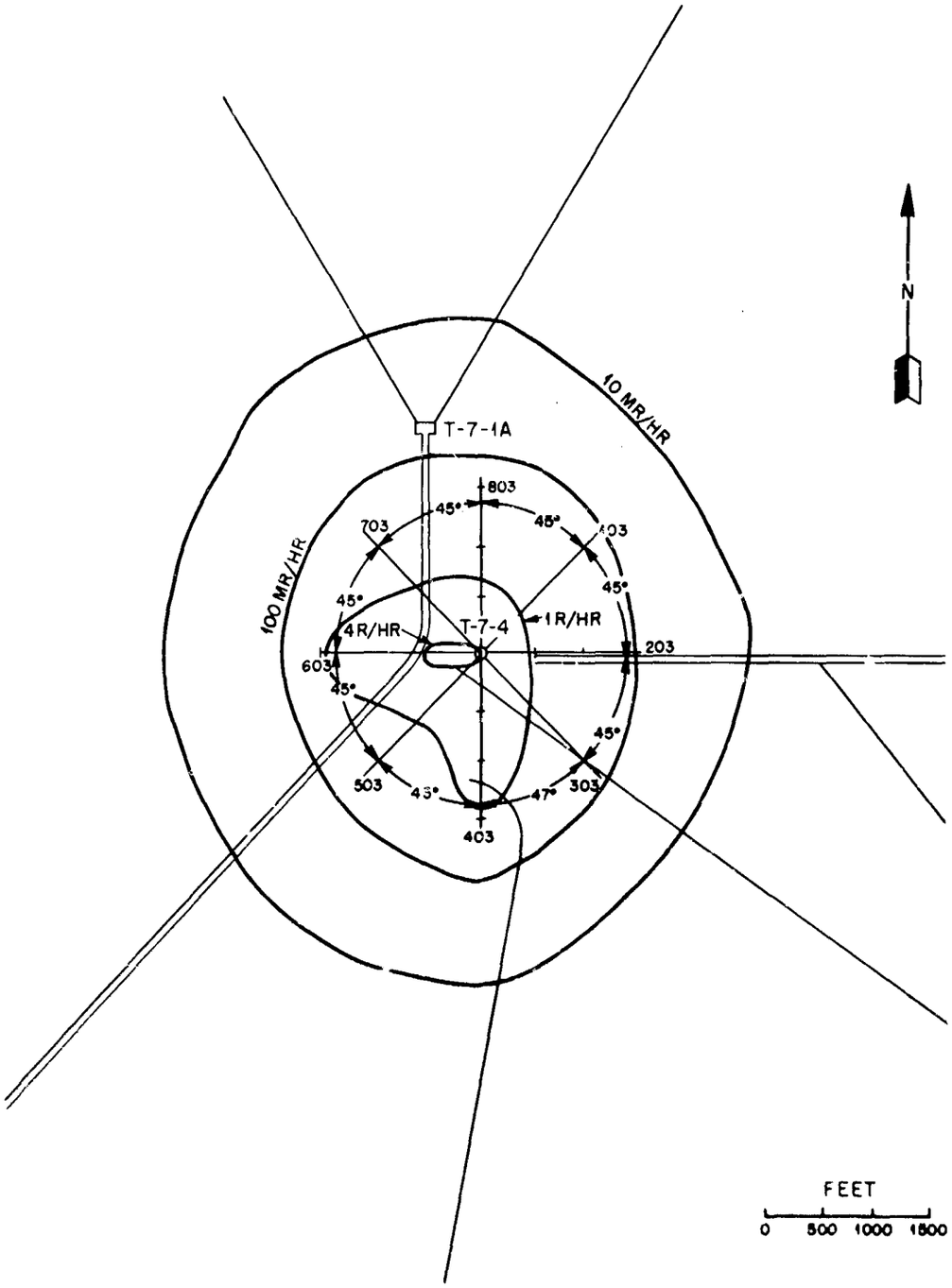


Fig. 3.4—Resurvey 2, Wasp. Area, T-7-4; date, 19 February 1955; survey time, 0944 to 1010 hr.

Table 3.4—RESULTS OF SURVEYS, MOTH

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
Initial Survey, 22 February 1955					
137.7	10	0621	509.5	100	0614
130.0	100	0625	506.4	1,000	0617
124.0	1,000	0629	503.2	10,000	0621
118.5	10,000	0632	603.3	10,000	0640
205.0	10,000	0750	607.0	1,000	0637
206.8	1,000	0751	610.0	100	0635
209.5	100	0753	618.3	10	0627
333.8	10	0709	731.2	10	0613
308.9	100	0725	709.5	100	0628
305.0	1,000	0727	706.3	1,000	0630
301.4	10,000	0729	704.5	10,000	0632
406.1	1,000	0645	805.2	10,000	0635
410.0	100	0643	807.0	1,000	0638
413.8	10	0642	811.4	100	0645
514.0	10	0611	816.5	10	0649
Resurvey 1, 23 February 1955					
121.0	10	0744	509.5	10	0731
118.0	100	0746	506.0	100	0734
106.5	1,000	0750	502.8	1,000	0739
104.0	10,000	0752	501.2	10,000	0742
204.0	10,000	0807	602.5	10,000	0749
206.5	1,000	0809	604.2	1,000	0747
207.4	100	0811	606.7	100	0756
210.0	10	0812	610.0	10	0758
310.0	10	0754	709.2	10	0738
306.1	100	0752	705.4	100	0741
303.2	1,000	0746	703.1	1,000	0742
301.5	10,000	0748	701.2	10,000	0743
402.5	10,000	0741	802.2	10,000	0751
404.2	1,000	0739	804.1	1,000	0749
406.0	100	0736	806.1	100	0748
411.8	10	0734	810.2	10	0746
Resurvey 2, 24 February 1955					
121.0	10	0710	509.0	10	0702
115.0	100	0712	504.5	100	0706
105.5	1,000	0714	502.8	1,000	0709
102.0	10,000	0716	501.1	10,000	0711
201.5	10,000	0723	601.6	10,000	0713
203.0	1,000	0724	603.4	1,000	0715
205.5	100	0725	605.5	100	0717
208.5	10	0726	608.6	10	0723
308.6	10	0725	707.2	10	0713
304.1	100	0717	704.2	100	0714
303.2	1,000	0720	700.4	1,000	0716
300.6	10,000	0722	700.1	10,000	0717
400.2	10,000	0712	800.5	10,000	0719
401.6	1,000	0710	802.2	1,000	0720
403.4	100	0708	805.4	100	0722
409.9	10	0705	808.7	10	0724

Table 3.4 — (Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 3, 28 February 1955			
204.8	10	1101	502.8	10	1057
203.2	100	1103	501.3	100	1059
201.5	1,000	1105	500.5	1,000	1100
GZ	10,000+	1108	GZ	10,000+	1104
118	10	1140	603.7	10	1118
104.2	100	1145	602.0	100	1120
102.5	1,000	1147	601.0	1,000	1121
GZ	10,000+	1149	GZ	10,000+	1125
402.7	10	1103	703.0	10	1116
401.1	100	1105	701.5	100	1118
400.5	1,000	1107	701.0	1,000	1119
GZ	10,000+	1109	GZ	10,000+	1120
302.5	10	1115	804	10	1129
301	100	1118	801.5	100	1131
300.5	1,000	1120	800.7	1,000	1132
Sta. 3-300 (3000 ft az. 265° from GZ)	0	1111	GZ	10,000+	1134
Sta. 3-330 (2000 ft az. 265° from GZ)	0.6	1118			

Resurvey 4, 4 March 1955

Stake line location	Intensity, mr/hr	Stake line location	Intensity, mr/hr
106 + 30 yd	10	505 + 0.2 mile	10
106 + 0.15 mile*	100	505 + 0.4 mile	100
106 + 0.2 mile	1,000	505 + 0.44 mile	1,000
GZ	45,000	GZ	2,500
205 + 0.1 mile	10	606 + 0.2 mile	10
205 + 0.15 mile	100	606 + 0.25 mile	100
205 + 0.2 mile	1,000	606 + 0.25 mile + 25 yd	1,000
GZ	4,000	GZ	7,800
305 + 0.2 mile	10	703 + 0.1 mile	10
305 + 0.25 mile	100	703 + 0.15 mile	100
305 + 0.3 mile	1,000	703 + 0.2 mile	1,000
GZ	4,000	GZ	5,000
406 + 0.15 mile	10	406 + 0.2 mile	100
406 + 0.2 mile + 30 yd	1,000	GZ	4,000

* Tenths of miles mean toward Ground Zero.

Table 3.5—HELICOPTER DATA, MOTH*

Location	Intensity (T1B), mr/hr	Probe intensity, mr/hr	Altitude above terrain, ft	Time	Computed ground reading,† mr/hr
Area 1				0558	Area clear
Area 4				0601	Area clear
Area 2				0604	Area clear
Area 10				0610	Area clear
Area 9				0612	Area clear
Area 7-4	20		1600	0632	
S (Sta. 7-360, 14,200 ft az. 57.5° from T-3)	30	2,000	500	0640	360
T (Sta. 21.2a, 3100 ft az. 115° from T-3)	25	120	500	0647	300
W (Sta. 3-330, 2000 ft az. 265° from T-3)	1000	18,000	500	0655	12,000
X (Sta. 3-300, 3000 ft az. 265° from T-3)	150	800	500	0657	1,800

* Data taken 22 February 1955.

† Computed ground reading taken from "Correlation Curves for Air to Ground Readings," 3 April 1953, Operation Upshot-Knothole Rad-Safe Report WT-817, Chap. 14.

Table 3.6—MISCELLANEOUS READINGS, MOTH

Location	Intensity, mr/hr	Time	Remarks
		22 February 1955	
3-355	0.5	0757	2 miles SE of T-3
3-356			10,400 ft az. 44° from T-3
3-356 + 0.1 mile S	400	0741	
3-356 + 0.2 mile S	500	0743	
3-356 + 0.3 mile S	600	0744	
3-356 + 0.4 mile S	600	0745	
3-356 + 0.8 mile S	2,000	0746	
Stake 711.0	10	0815	
3-356 + 0.3 mile W	10	0813	10,400 ft az. 44° from T-3
CP 2	2	0553	
3-300	20	0900	3000 ft az. 265° from T-3
GZ	13,000	0725	300 ft on a bearing 340°
GZ	8,000	0722	400 ft on a bearing 325°
F. Flat area		0607	
		23 February 1955	
Tower 3a	5	0730	Concrete slab
Tower 3a	10	0741	Ground reading
Tower 3a	6	0743	At an altitude of 50 ft
Tower 3a	20	0746	100 yd E
Tower 3a	20	0748	100 yd N
7-360	7	0737	14,200 ft az. 057.5° from T-3
GZ, Area 7-4	70	0801	
3-300 (roof)	100	0754	3000 ft az. 265° from T-3

Table 3.6 — (Continued)

Location	Intensity, mr/hr	Time	Remarks
		23 February 1955	
3-300 (door)	20	0754	
7-330	100	0754	2000 ft az. 265° from T-3
3-355	0.2	0818	2 miles SE of T-3
3-356	15	0831	0.2 mile S of 3-356 along road running N and S through this station (10,400 ft az. 44° from T-3)
3-356	32	0833	0.4 mile S of 3-356 along road running N and S through this station (10,400 ft az. 44° from T-3)
3-356		0834	0.6 mile S of 3-356 along road running N and S through this station (10,400 ft az. 44° from T-3)
3-356	60	0834	0.8 mile S of 3-356 along road running N and S through this station (10,400 ft az. 44° from T-3)
3-356	130	0835	1.0 mile S of 3-356 along road running N and S through this station (10,400 ft az. 44° from T-3)
3-356	120	0836	1.2 miles S of 3-356 along road running N and S through this station (10,400 ft az. 44° from T-3)
3-356	55	0836	1.4 miles S of 3-356 along road running N and S through this station (10,400 ft az. 44° from T-3)
3-356	30	0837	1.6 miles S of 3-356 along road running N and S through this station (10,400 ft az. 44° from T-3)
3-356	4	0837	1.8 miles S of 3-356 along road running N and S through this station (10,400 ft az. 44° from T-3)
Stake 217.0	10	0818	
Stake 225.5	150	0820	
Stake 236.0	37	0828	
Stake 213.0	5	0913	
Stake 217.0	10	0915	
Stake 222.0	100	0916	
Stake 225.0	150	0919	
Stake 235.0	100	0923	
Stake 216.0	30	1010	
Stake 215.0	20	1012	
Stake 214.0	10	1013	
Stake 214.0	6	1014	
Stake 212.0	6	1015	
Stake 211.0	8	1016	
Stake 210.0	12	1017	
212 + 0.1 mile	10	1018	On a line drawn from stake 212 to T-7
212 + 0.2 mile	20	1019	
212 + 0.25 mile	50	1020	
212 + 0.30 mile	100	1022	
212 + 0.40 mile	300	1024	
212 + 0.50 mile	450	1028	
212 + 0.55 mile	500	1029	
212 + 0.60 mile	400	1030	
Stake 116.5	250	1031	

Table 3.6—(Continued)

Location	Intensity, mr/hr	Time	Remarks
		23 February 1955	
Stake 122	100	1036	
Stake 236	150	1052	
Stake 240.4	100	1100	
Stake 253.6	10	1110	
		24 February 1955	
GZ, Area 7-4	20	0731	
Sta. 3-330	30	0721	2000 ft az. 265° from T-3
Sta. 3-330 (door)	8	0722	
Sta. 3-300	4	0726	3000 ft az. 265° from T-3
Sta. 3-300 (door)	0.6	0727	
Stake 216.0	10	0726	
Stake 206	100	0843	
Stake 223.2	100	0849	
Stake 227	100	0856	
Stake 232	100	0859	
Sta. 3-355	0.2	0735	
Sta. 3-355	0.2	0740	On road between Sta. 3-355 and 3-356 0.2 mile N of Sta. 3-355
Sta. 3-355	0.2	0743	0.4 mile N of Sta. 3-355
Sta. 3-355	0.2	0744	0.6 mile N of Sta. 3-355
Sta. 3-355	0.4	0748	0.8 mile N of Sta. 3-355
Sta. 3-355	1.8	0751	0.9 mile N of Sta. 3-355
Sta. 3-355	6	0753	1.0 mile N of Sta. 3-355
Sta. 3-355	15	0754	1.1 miles N of Sta. 3-355
Sta. 3-355	25	0757	1.2 miles N of Sta. 3-355
Sta. 3-355	44	0758	1.3 miles N of Sta. 3-355
Sta. 3-355	60	0759	1.4 miles N of Sta. 3-355
Sta. 3-355	80	0802	1.5 miles N of Sta. 3-355
Sta. 3-355	140	0804	1.6 miles N of Sta. 3-355 (2 miles SE of T-3)
Stake 225	100	0908	0.1 mile N of stake 225
Stake 225	70	0911	0.2 mile N of stake 225
Stake 225	40	0913	0.3 mile N of stake 225
Stake 225	32	0913	0.4 mile N of stake 225
Stake 225	20	0916	0.5 mile N of stake 225
Stake 225	18	0917	0.6 mile N of stake 225
Stake 225	24	0919	0.7 mile N of stake 225
Stake 225	14	0921	0.8 mile N of stake 225
Stake 225	10	0922	0.9 mile N of stake 225
Stake 225	8	0923	1.0 mile N of stake 225
Stake 225	10	0926	1.1 miles N of stake 225
GZ, Area 3	6,000	1205	3 March 1955

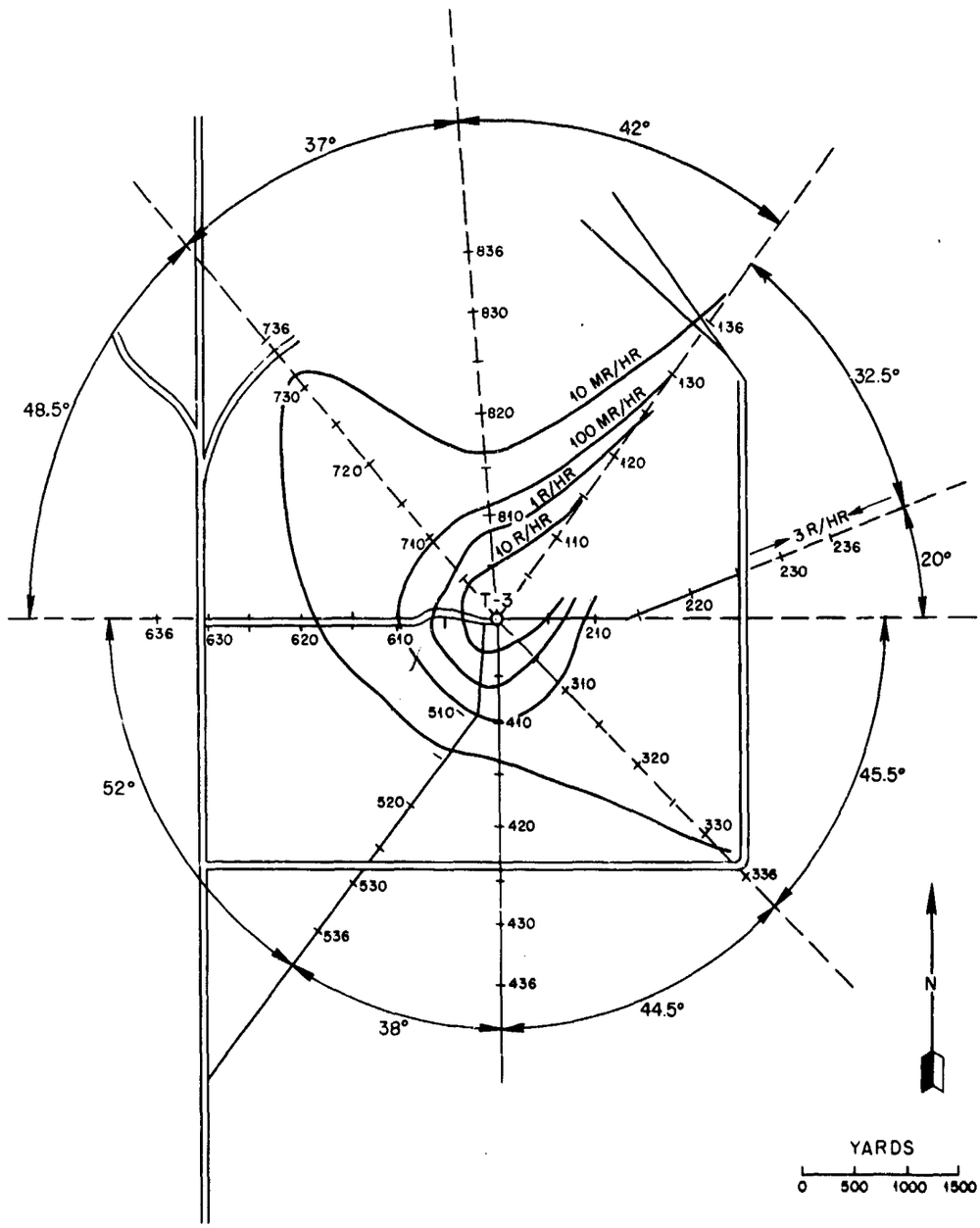


Fig. 3.6—Initial survey, Moth. Area, T-3; date, 22 February 1955; survey time, 0612 to 0730 hr.

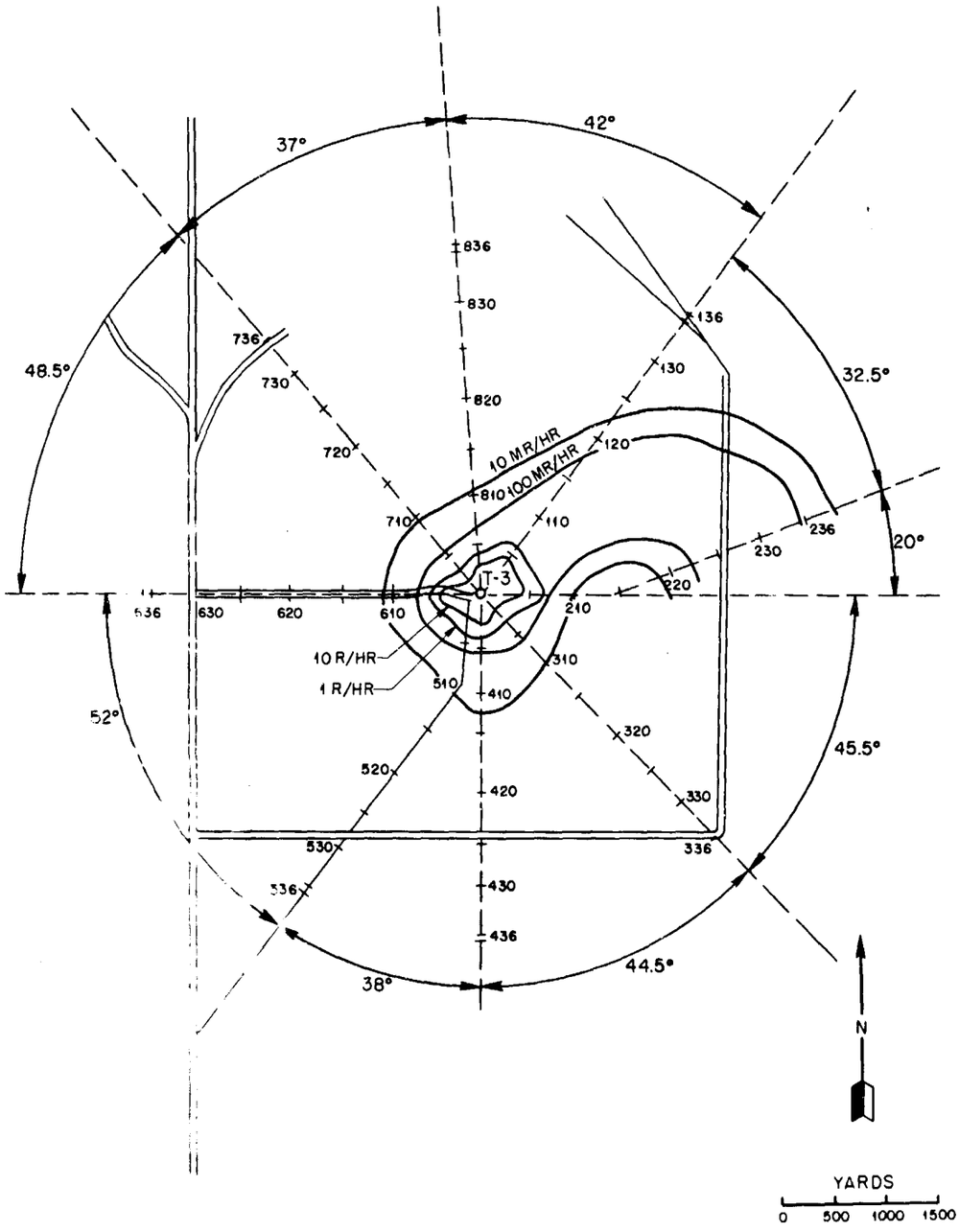


Fig. 3.6—Resurvey 1. Moth. **Area, T-3; date, 23 February 1955; survey time, 0745 to 0900 hr.**

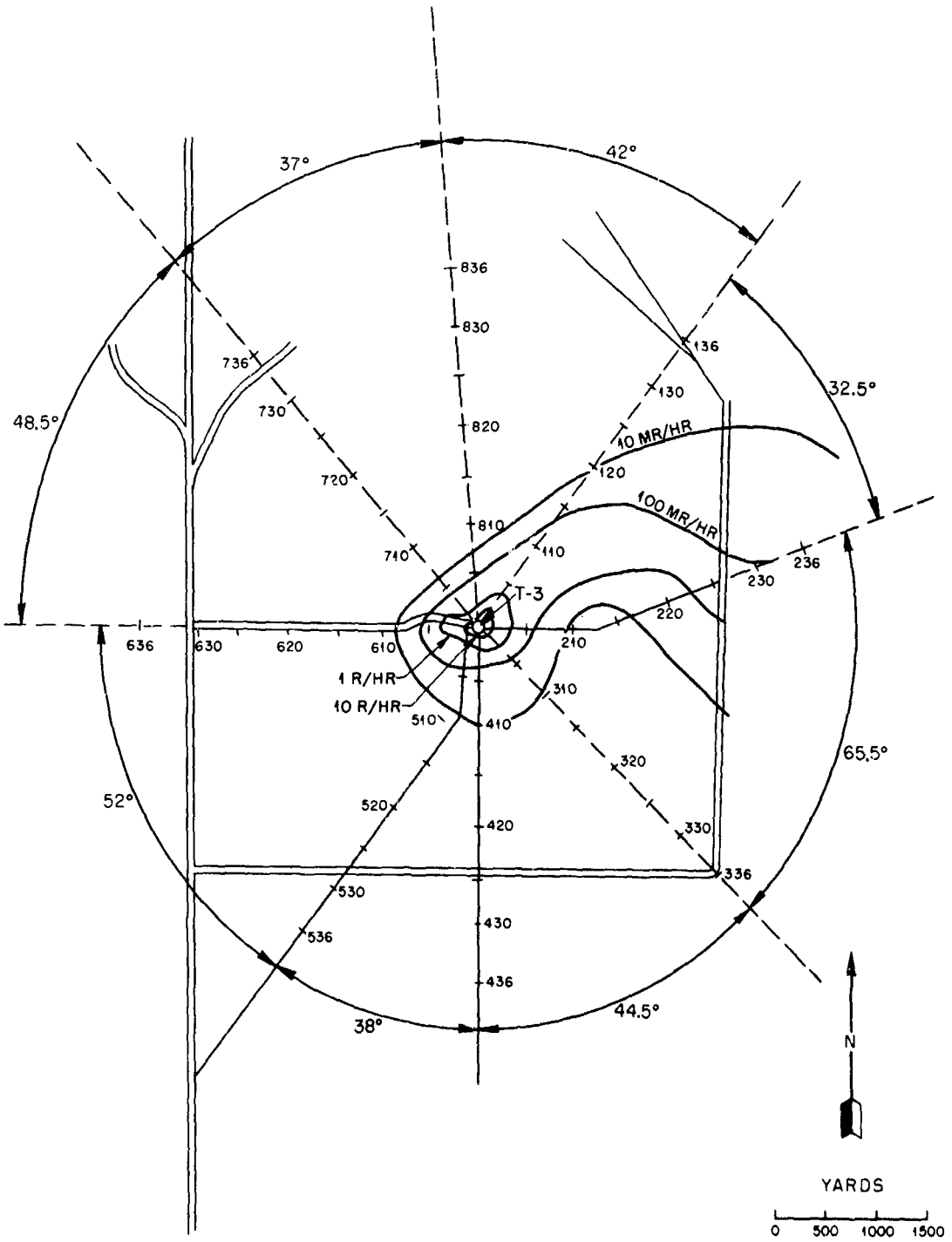


Fig. 3.7—Resurvey 2, Moth. Area, T-3; date, 24 February 1955; survey time, 0701 to 0800 hr.

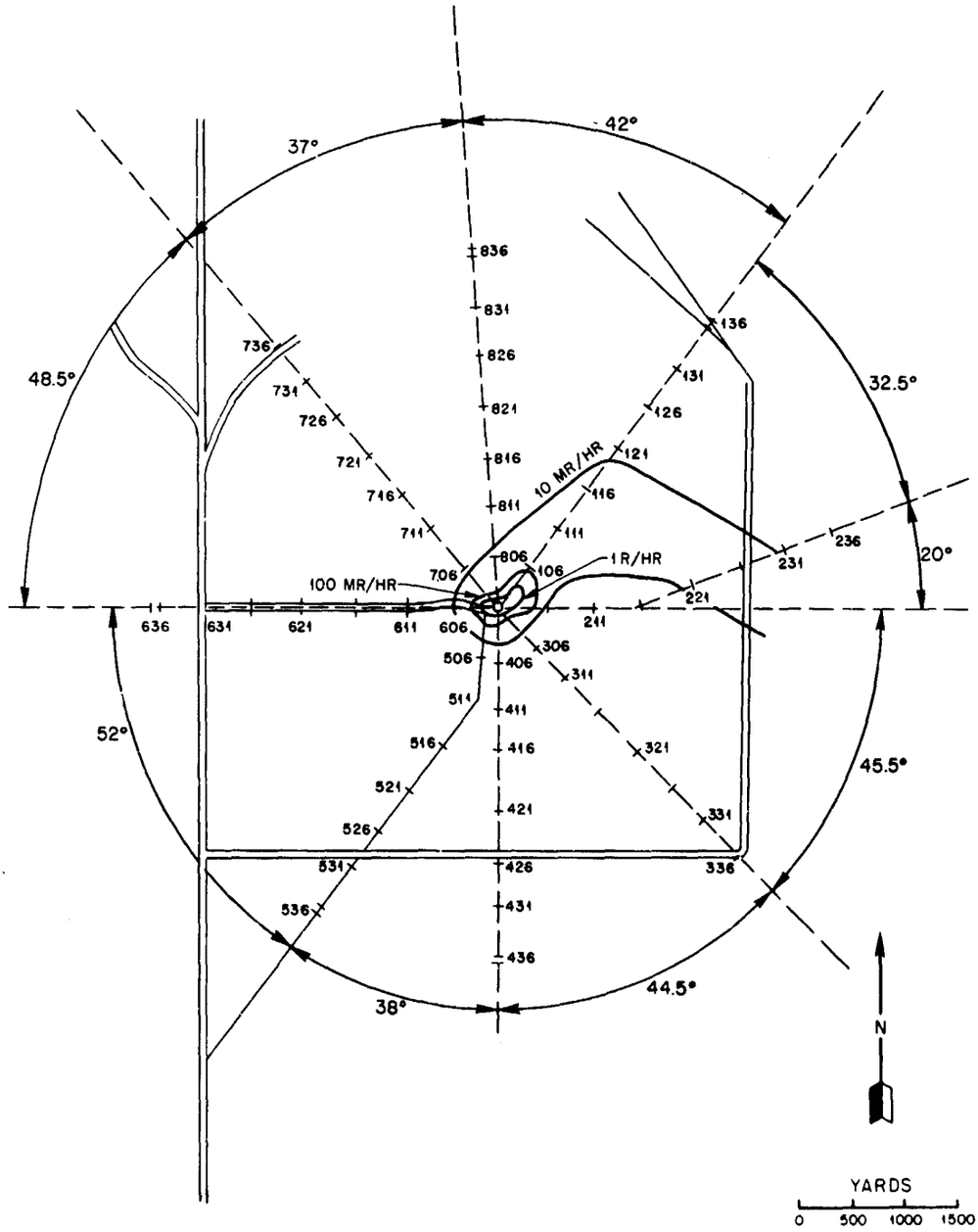


Fig. 3.8—Resurvey 3, Moth. Area, T-3; date, 28 February 1955; survey time, 1100 to 1200 hr.

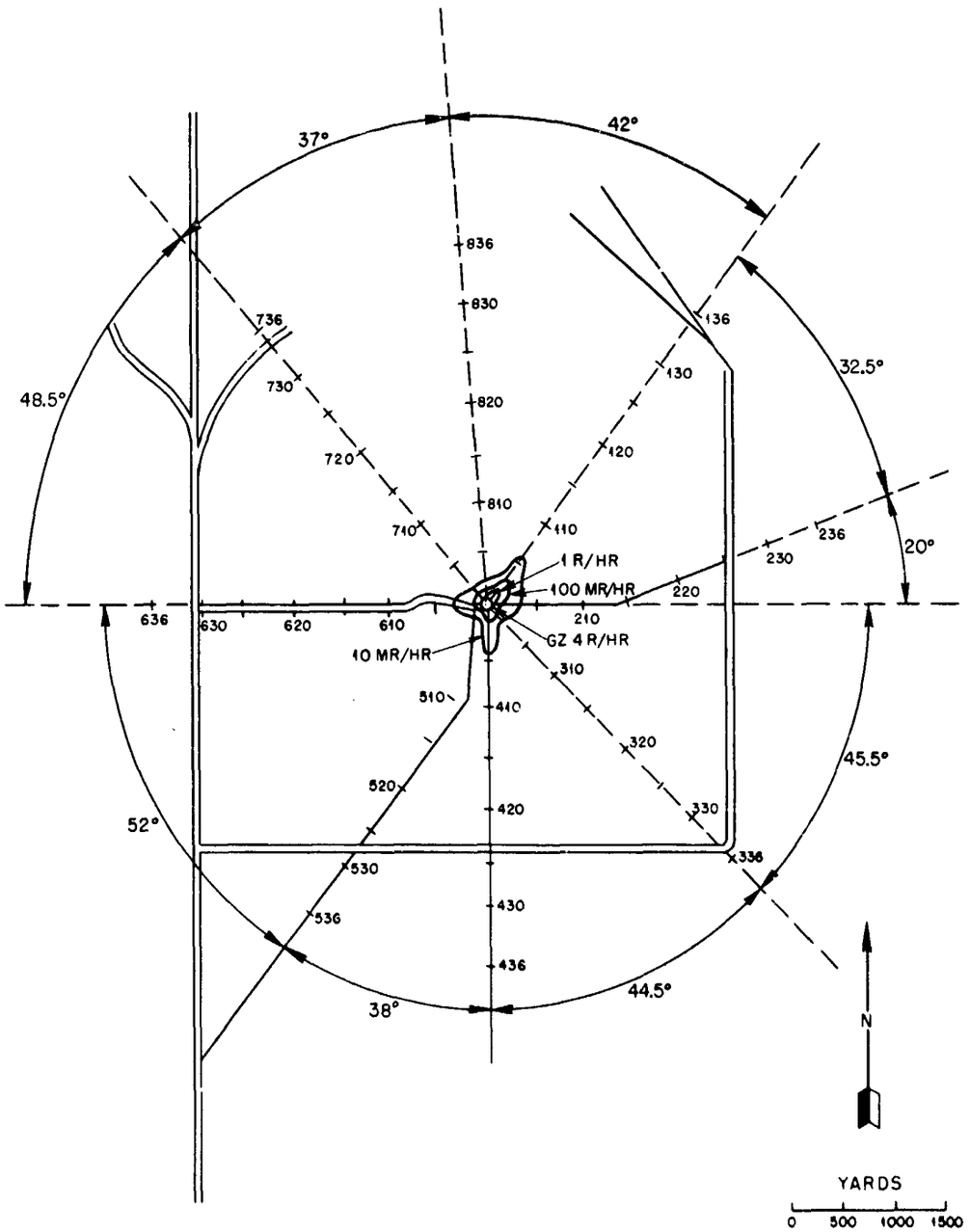


Fig. 3.9—Resurvey 4, Moth. Area, T-3; date, 4 March 1955; survey time, 1100 to 1145 hr.

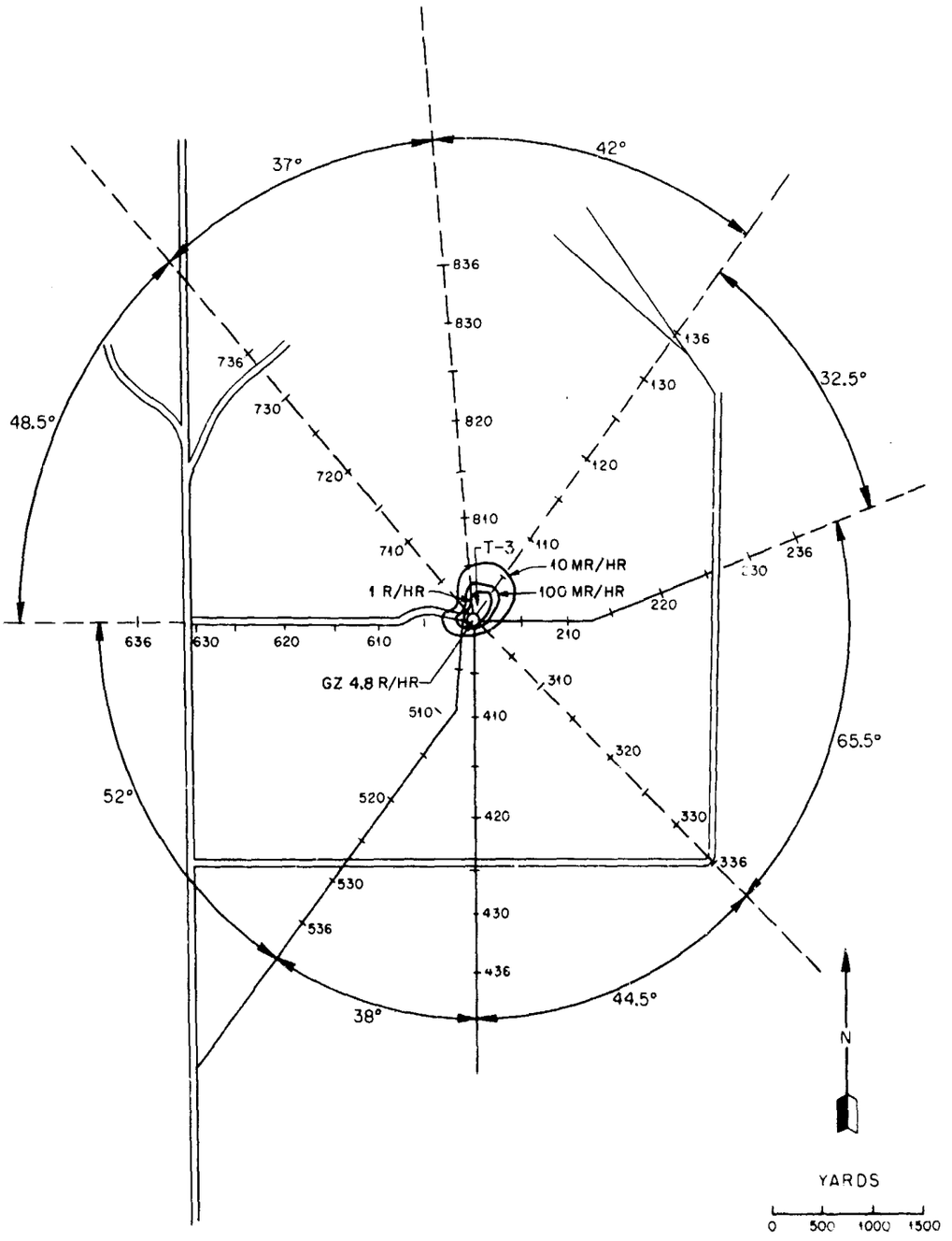


Fig. 3.10 —Resurvey 5, Moth. Area, T-3; date, 9 March 1955; survey time, 0850 to 1010 hr.

3.4 SHOT TESLA

The initial survey party was given a final briefing at 0500 hr. The shot took p' ce at 0530 hr, 1 March 1955, in Area 9b. Two minutes after the device was detonated on a 300-ft tower, the survey teams departed from the Rad-Safe Building. The survey started at 0552 hr and was completed at 0635 hr. The helicopter survey of surrounding test areas and specific check points commenced at 0552 hr and was completed at 0642 hr.

Nine projects and work parties were briefed and were issued area access clearance forms after R-hour was declared by the Test Director at 0702 hr. One party of Project 2.2 received permission to enter contaminated areas above the 10 r/hr line from the Rad-Safe Officer. This party reported readings of 25 r/hr, 3000 ft from Ground Zero on a bearing of 65°, at 0830 hr, and greater than 50 r/hr on this same bearing at 500 yd.

At the request of the Test Director, a Rad-Safe team was sent to Ground Zero at 0740 hr to collect a soil sample for an alpha radiation study. This team reported the AN/PDR-T1B instrument went off the 50 r/hr scale 300 yd from Ground Zero.

A resurvey of the Tesla area was conducted at 1430–1535 hr, on D-day. In this 9-hr period the 10 mr/hr and 100 mr/hr isointensity lines receded an average distance of 300 yd, and the 10 r/hr line had receded to approximately one-half its initial area.

The following parties were released into the Tesla area: on 2 March, 4 parties; 3 March, 7 parties; and 4 March, 7 parties. Six parties were released into other areas.

Survey data are shown in Tables 3.7 to 3.9. Isointensity plots are shown in Figs. 3.11 to 3.17.

3.5 SHOT TURK

Shot Turk was detonated at 0520 hr, 7 March 1955, on a 500-ft tower in Area 2. Owing to unusual wind conditions at varying altitudes, it was predicted that the Control Point area would be in the path of the fall-out pattern. An evacuation plan for the CP area was made up. Official observers were to be evacuated immediately after the shot. They were to be followed by Rad-Safe personnel not required for specific assignments. Film badges not required for the day were evacuated to the Las Vegas Field Office 20 min prior to H-hour to prevent their exposure. The evacuation procedure was in effect immediately after the shot. Official observers and recovery personnel were evacuated; however, other than men to escort the film badges, no Rad-Safe personnel were evacuated. The evacuation plan was canceled at 0630 hr since it was apparent that the atomic cloud would not contaminate the CP area.

The initial survey team departed from the Rad-Safe Building at H + 10 min. The survey started at 0630 hr and was completed at 0915 hr. R-hour was declared by the Test Director at 0825 hr. The on-site fall-out pattern was not closed because of the mountainous terrain in the southwest sector. Readings as high as 100 r/hr were reported on the Scientific Recovery road southwest of Ground Zero by a survey team equipped with a Jordan survey instrument.

On shot day 23 parties of 19 participating projects were briefed by this section. The following parties were briefed for entry into the Turk area: on 8 March, 11 parties; 9 March, 16 parties; 10 March, 8 parties; 11 March, 3 parties; 12 March, 2 parties; and 13 March, 1 party.

Survey data are shown in Tables 3.10 to 3.12. Isointensity plots are shown in Figs. 3.18 to 3.25.

3.6 SHOT HORNET

Initial survey parties, road patrols, and check point personnel were given a final briefing at 0445 hr. The device was detonated at 0520 hr, 12 March 1955, on a 300-ft tower in Area 3a. Ground and helicopter survey teams were dispatched from the Control Point area at 0522 and 0525 hr, respectively. The actual survey by the ground teams began at 0553 and was completed at 0735 hr, and the helicopter survey took place between 0556 and 0633 hr.

(Text continues on page 70.)

Table 3.7—RESULTS OF SURVEYS, TESLA

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey, 1 March 1955			
212.0	1,000	0601	307.2	10,000	0606
207.5	10,000	0604	439.6	10	0621
522.0	10	0602	420.3	100	0614
517.5	100	0604	412.5	1,000	0612
512.0	1,000	0608	409.8	10,000	0610
509.0	10,000	0610	720.3	10	0600
607.5	10,000	0629	714	100	0605
610.0	1,000	0627	710.4	1,000	0608
614.0	100	0624	708.8	10,000	0610
616.7	10	0622	832.6	10	0625
325.5	10	0559	823.8	100	0628
316.7	100	0601	814.0	1,000	0630
311.0	1,000	0604	812.2	10,000	0635
		Resurvey 1, 1 March 1955			
AY (7000 ft az. 90° from T-9b)	10	1510	407.7	1,000	1447
			411.5	100	1457
AY (12 miles toward AX)	100	1513	416.8	10	1500
			515.0	10	1442
AX (6700 ft az. 69° from T-9b)	1,000	1514	511.2	100	1445
			508.8	1,000	1448
233.4	1,000	1525	506.2	10,000	1450
229.1	1,000	1527	605.0	10,000	1517
223.8	1,000	1528	607.0	1,000	1514
111.1	10,000	1532	610.2	100	1511
204.2	10,000	1455	614.5	10	1458
207.0	1,000	1453	713.5	10	1449
210.0	100	1451	709.8	100	1451
214.0	10	1458	707.3	1,000	1454
316.8	10	1442	704.8	10,000	1455
312.0	100	1445	804.8	10,000	1521
308.0	1,000	1447	810.0	1,000	1517
304.2	10,000	1449	813.0	100	1515
404.0	10,000	1455	820.3	10	1511
		Resurvey 2, 2 March 1955			
104.0	10,000	1422	509.1	100	1354
115.0	2,000	1419	507.2	1,000	1358
213.0	10	1350	503.8	10,000	1359
212.5	10	1351	612.0	10	1406
208.0	100	1352	608.7	100	1409
205.2	1,000	1354	606.0	1,000	1411
203.0	10,000	1356	604.5	10,000	1413
314.5	10	1347	711.5	10	1350
309.7	100	1350	708.2	100	1354
305.8	1,000	1352	705.0	1,000	1355
304.2	10,000	1354	701.5	10,000	1357
413.4	10	1404	815.0	10	1410
409.6	100	1402	811.6	100	1411
407.0	1,000	1400	808.2	1,000	1413
404.2	10,000	1356	801.5	10,000	1415
512.0	10	1351			

Table 3.7—(Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 3, 4 March 1955			
0.15 mile S of AX	10	0640	402.0	10,000	0640
AX (6700 ft az. 71° from T-9b)	100	0642	404.2	1,000	0639
			407.4	100	0637
AW (10,200 ft az. 50° from T-9b)	380	0646	410.6	10	0635
			510.5	10	0625
AV (7000 ft az. 50° from T-9b)	480	0650	508.0	100	0627
			506.5	1,000	0628
115.0	500	0645	501.0	10,000	0631
110.0	1,000	0657	601.0	10,000	0642
101.2	10,000	0702	605.0	1,000	0640
201.5	10,000	0630	607.0	100	0638
205.0	1,000	0626	610.0	10	0636
9-300(206.5) (2000 ft az. 109° from T-9b)	100	0624	709.2	10	0630
			707.2	100	0631
			703.2	1,000	0634
208.0	10	0622	700.5	10,000	0637
311.0	10	0625	800.5	10,000	0640
306.8	100	0627	805.8	1,000	0648
304.2	1,000	0629	810.2	100	0646
302.0	10,000	0630	813.2	10	0644
		Resurvey 4, 8 March 1955			
141.4	32		509	10	0658
134.4	100		507.7	100	0700
104.4	1,000		504.2	1,000	0704
GZ	5,800		GZ	9,000	0710
205.8	10		607.0	10	0718
202.5	100		606.0	100	0720
201.6	1,000		603.8	1,000	0722
GZ	5,800		GZ	9,000	0725
305.7	10	0653	707.5	10	0655
303.4	100	0655	704.0	100	0657
302.5	1,000	0657	701.0	1,000	0658
GZ	5,000	0659	GZ	3,000	0700
401.8	1,000	0702	812.0	10	0708
403.5	100	0705	807.0	100	0710
409.1	10	0708	801.5	1,000	0713
GZ	5,000	0715			
		Resurvey 5, 16 March 1955			
115.0 + 1.5 miles*	10	0720	508.7	10	1650
115.0 + 0.5 mile	100	0722	507.0	100	1653
115.0 + 0.1 mile	1,000	0723	504.0 + 0.2 mile	1,000	1657
207.0 + 0.2 mile	10	0730	608.0 + 0.1 mile	10	0700
207.0 + 0.3 mile	100	0731	608.0 + 0.2 mile	100	0702
207.0 + 0.4 mile	1,000	0733	608.0 + 0.3 mile	1,000	0703
307.0 + 0.7 mile	1,000	0659	707.5	10	0708
307.0 + 0.25 mile	100	0700	704.0	100	0709
307.0 + 0.125 mile	10	0702	704.0 + 0.1 mile	1,000	0712
408.0	10	0650	811.5	10	0715
406.7	100	0653	806.0	100	0717
406.0 + 0.3 mile	1,000	0655	805.0 + 0.1 mile	1,000	0719
GZ	2,400	0657			

Table 3.7—(Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 6, 6 April 1955			
0.3 mile E of GZ	10	1300	Stake 811	10	1329
0.4 mile E of GZ	100	1302	Stake 114	100	1335
GZ	1,700	1305	0.1 mile W of 811	100	1337
Steel at GZ	2,000	1305	from AM (2000 ft		
0.5 mile W of GZ	10	1307	az. 109° from		
0.2 mile W of GZ	100	1306	T-9b)		
0.3 mile S of GZ	10	1311	0.2 mile N of 811	10	1339
0.2 mile S of GZ	100	1313	from AM (2000 ft		
0.3 mile N of GZ	100	1318	az. 109° from T-9b)		
Stake 810	10	1320			
		Resurvey 7, 4 May 1955			
604	10	1040	204	10	1050
602	100	1041	202	100	1051
505	10	1043	Old crater	30	1057
502	100	1044	1.8 mile NE of	10	1100
GZ	600	1045	9b		
404	10	1047	807	10	1109
402	100	1048	802	100	1110

*Decimals indicate mileage from Ground Zero, T-9b.

Table 3.8—HELICOPTER DATA, TESLA

Location	Intensity (T1B), mr/hr	Probe intensity, mr/hr	Altitude above terrain, ft	Time	Computed ground reading,* mr/hr
		Initial Survey, 1 March 1955			
Area 7	0	0	500	0552	0
Area 3	0	0	500	0553	0
Area 1	0	0	500	0554	0
Area 4	0	0	500	0555	0
Area 2	0	0	500	0556	0
Area 10	0	0	500	0557	0
Y (10,550 ft az. 124° from T-2)	0	0.5	350	0605	0
Z (12,200 ft az. 190° from T-9b)	5	11	420	0613	43.7
AK (5000 ft az. 185° from T-9b)	10	50	390	0625	76
AA (3700 ft az. 163° from T-9b)	200	1,500	390	0627	1,520
		2 March 1955			
AO (792 ft az. 109° from T-9b)		15,000		0720	
AN (304 ft az. 109° from T-9b)		120,000		0724	

*Computed ground reading taken from "Correlation Curves for Air to Ground Readings," 3 April 1953, Operation Upshot-Knothole Rad-Safe Report WT-817, Chap. 14.

Table 3.9—MISCELLANEOUS READINGS, TESLA

Location	Intensity, mr/hr	Time
Initial Survey, 1 March 1955		
AZ (5450 ft az. 131° from T-9b)	19	0555
0.2 mile NE along road bearing 342.5° from AZ	100	0558
Stake 138.0 from 7-1a in Area 7	100	
AY (7000 ft az. 90° from T-9b)	200	0615
AX (6700 ft az. 69° from T-9b)	10,000	0618
20 ft from AX	20,000	
AH (9100 ft az. 75° from T-9b)	10,000	0619
0.7 mile SE of AH along road leading to 7-356	5,000	0623
1.0 mile SE of AH along road leading to 7-356	1,000	0629
1.5 miles SE of AH along road leading to 7-356	100	0630
7-356 (9700 ft az. 49° from T-9b)	10	0632
Intersection of access road to tower F and Mercury highway	0	0545
Intersection of access road to tower F and Mercury highway	0	0703
Tower at F. Flat	0	0600
5 miles E of tower at F. Flat	0	0610
Tower 7	6	
Tower 7	4	0630
Tower 7	2	0645
Road from Y to tower 2	8	
1 mile E of stake 115.0 of 9b	10,000	
2 miles N of Y between A and C*	10	
1.5 miles N of Y between A and C	10	0652
2.0 miles N of Y between A and C	22	0653
2.1 miles N of Y between A and C	32	0655
2.2 miles N of Y between A and C	36	0656
2.4 miles N of Y between A and C	40	0656
2.6 miles N of Y between A and C	48	0657
3.2 miles N of Y between A and C	30	0658
3.3 miles N of Y between A and C	20	0658
3.5 miles N of Y between A and C	10	0659
AG (7800 ft az. 326° from T-9b)	0	
AA (3700 ft az. 163° from T-9b)	190	
AF (7500 ft az. 179° from T-9b)	18	0552
AF (7500 ft az. 179° from T-9b)	24	0557
AF (7500 ft az. 179° from T-9b)	2	1000
9-300 (2000 ft az. 109° from T-9b)	3,500	
3000 ft from GZ on a bearing 65°	25,000	0830
500 ft from GZ on a bearing 65°	>50,000	0835
300 yd from GZ on a bearing 110°	>50,000	0725
2 March 1955		
AA (road junction 3700 ft az. 163° from T-9b)	6	1345
AZ (road junction 5450 ft az. 131° from T-9b)	1,000	1347
AY (road junction 7000 ft az. 91° from T-9b)	1	1405
AX (road junction 6700 ft az. 71° from T-9b)	200	1408
AW (road junction 10,200 ft az. 50° from T-9b)	400	1412
AV (road junction 8500 ft az. 50° from T-9b)	1,000	1415
AH (road junction 9100 ft az. 75° from T-9b)	180	1430
0.5 mile from AH on road from AH to AW	100	1432
1.2 miles from AH on road from AH to AW	10	1436
50 yd from AX on road from AX to AY	100	1445
0.3 mile from AX on road from AX to AY	10	1447

*A, 11,700 ft az. 318° from T-3a; C, 8200 ft az. 276° from T-9b.

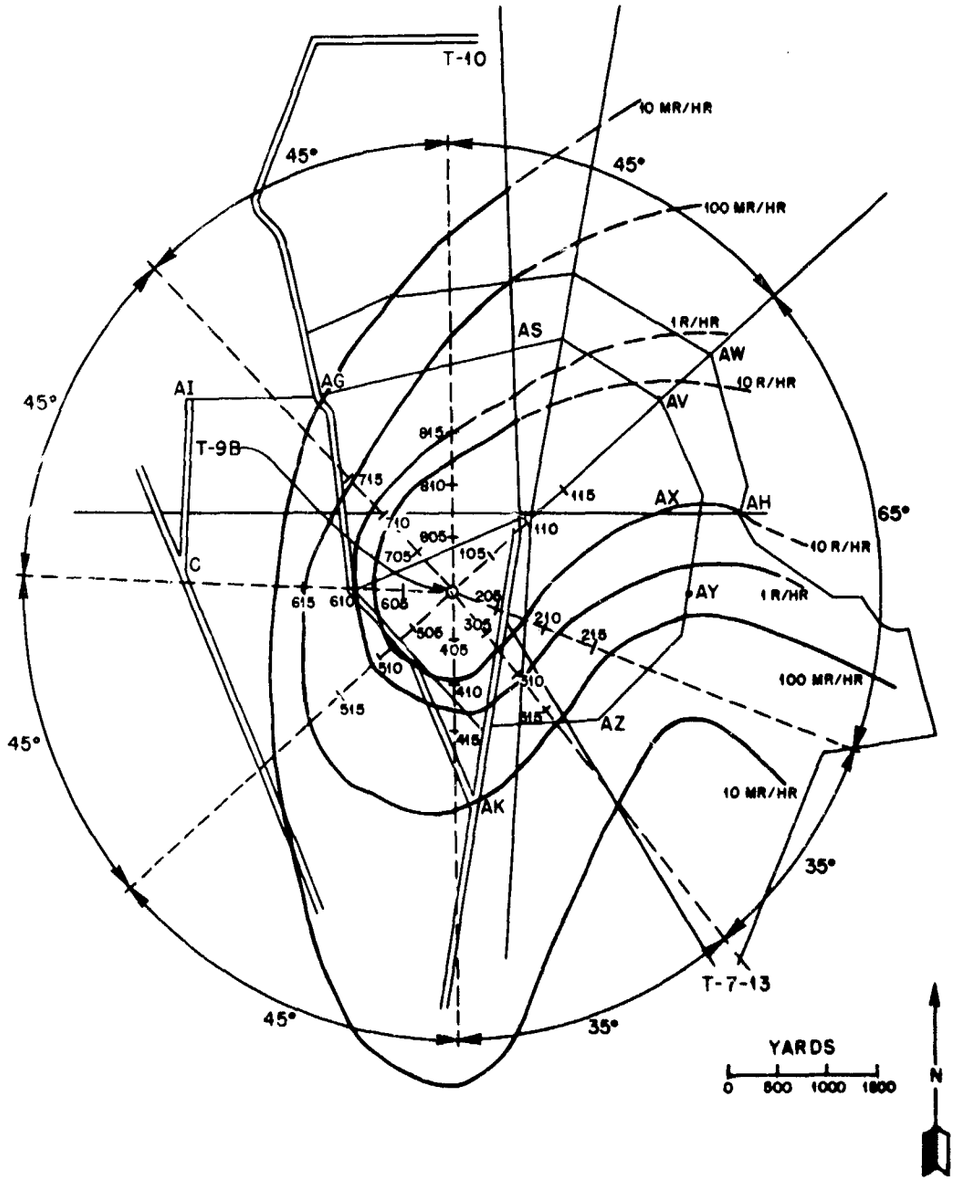


Fig. 3.11—Initial survey, Tesla. Area, T-9b; date, 1 March 1955; survey time, 0555 to 0632 hr.

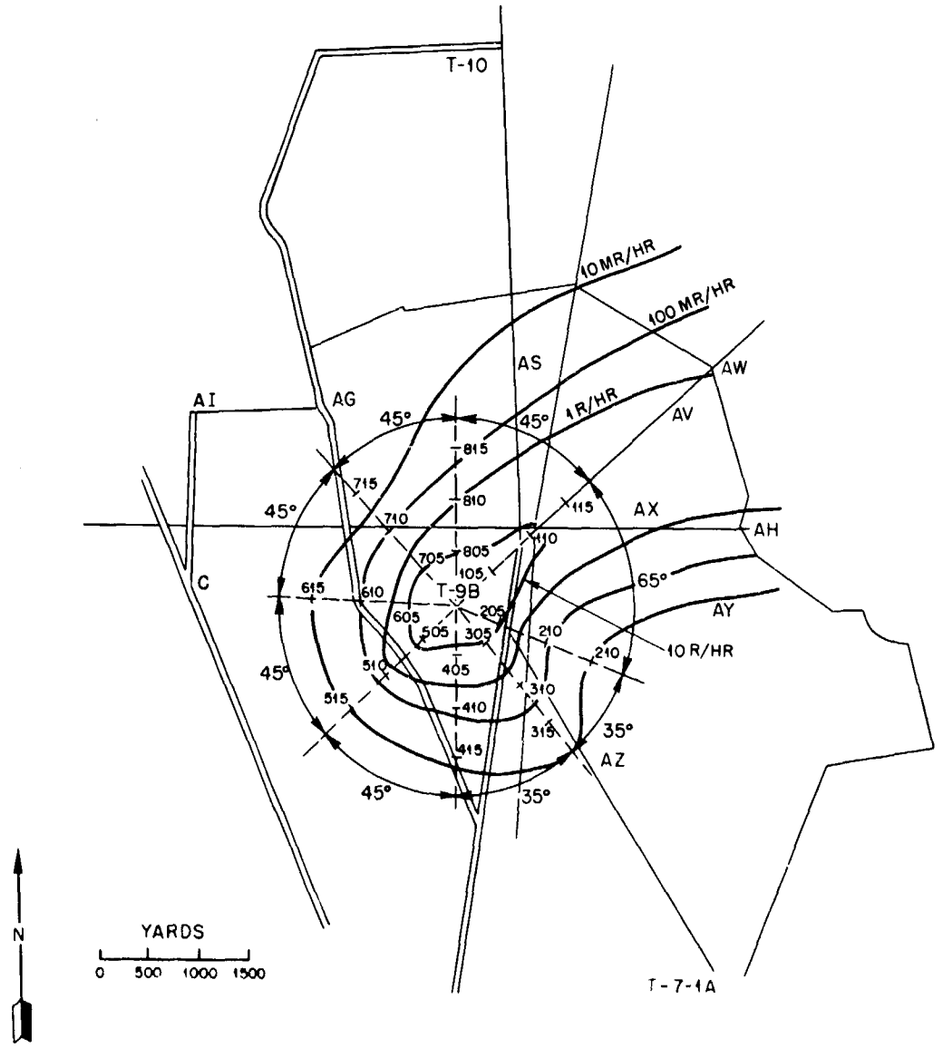


Fig. 3.12—Resurvey 1, Tesla, Area, T-9b; date, 1 March 1955; survey time, 1442 to 1535 hr.

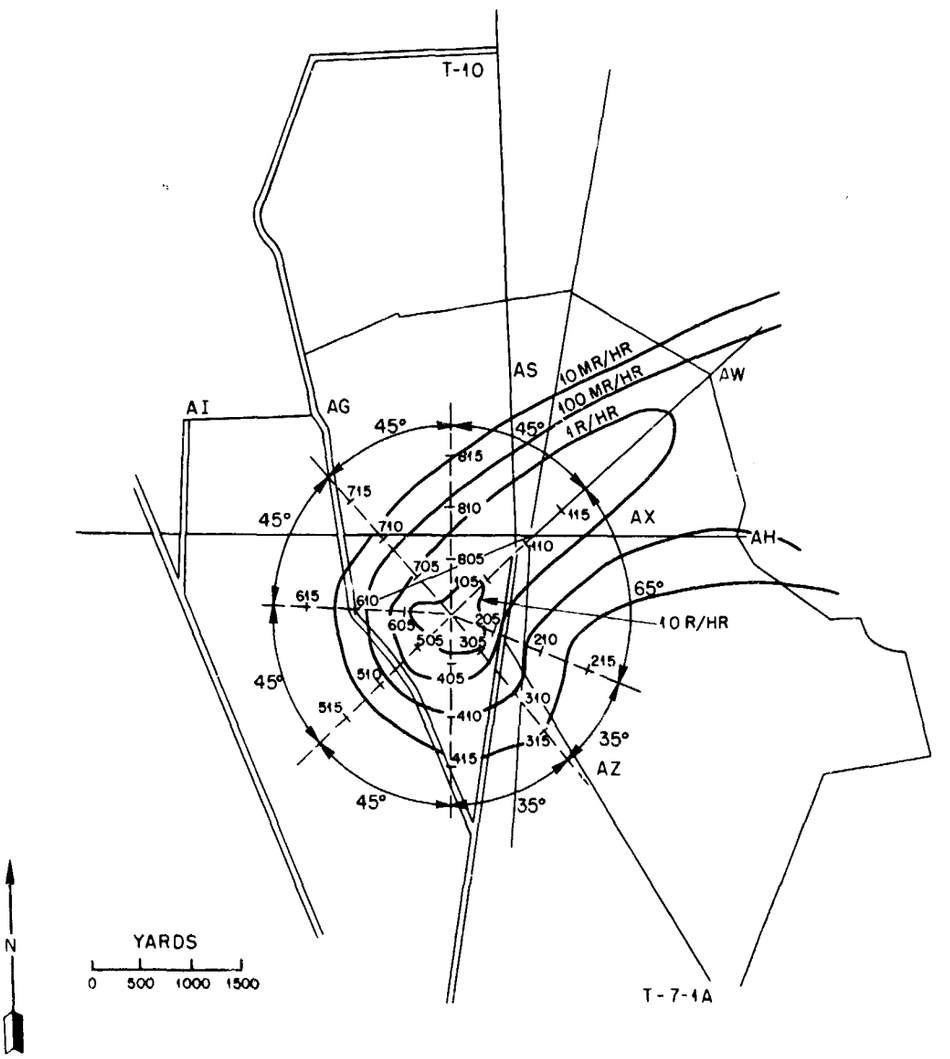


Fig. 3.13—Resurvey 2, Tesla. Area, T-9b; date, 2 March 1955; survey time, 1345 to 16[illegible] hr.

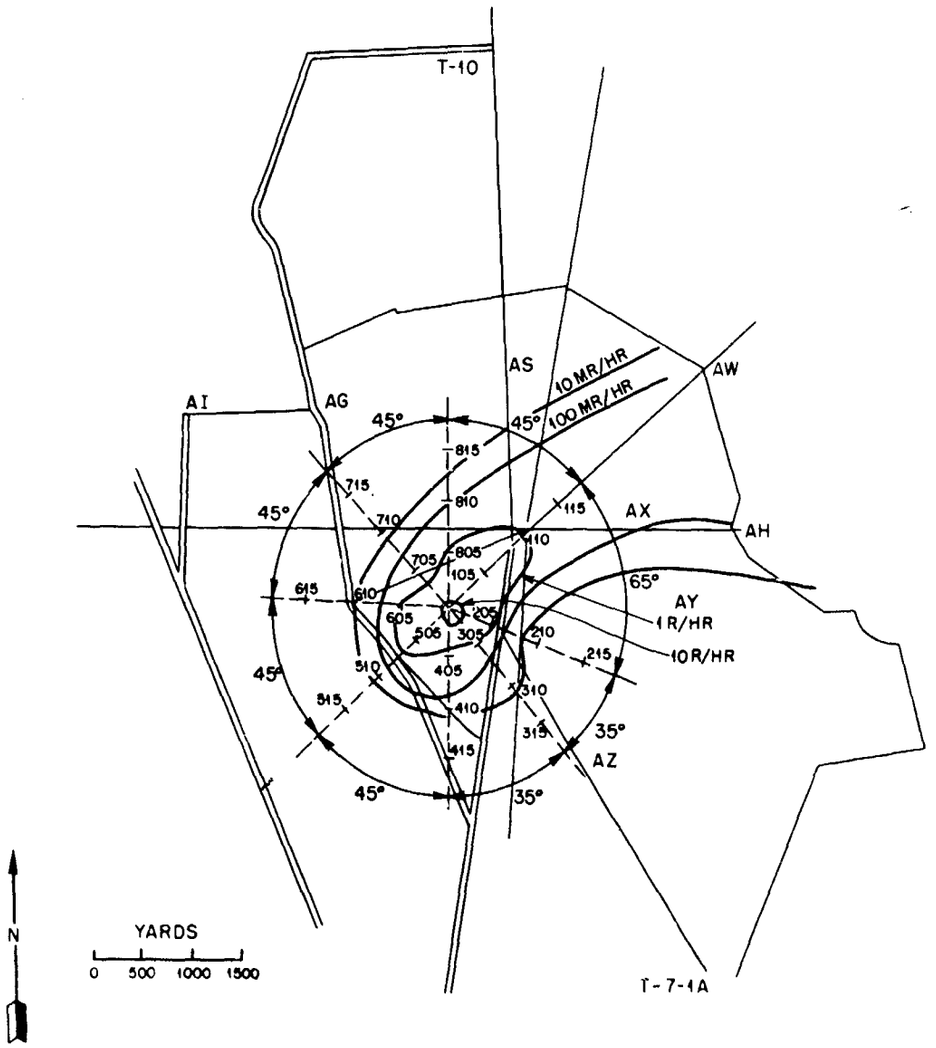


Fig. 3.14 —Resurvey 3, Tesla, Area, T-9b; date, 4 March 1955; survey time, 0615 to 0700 hr.

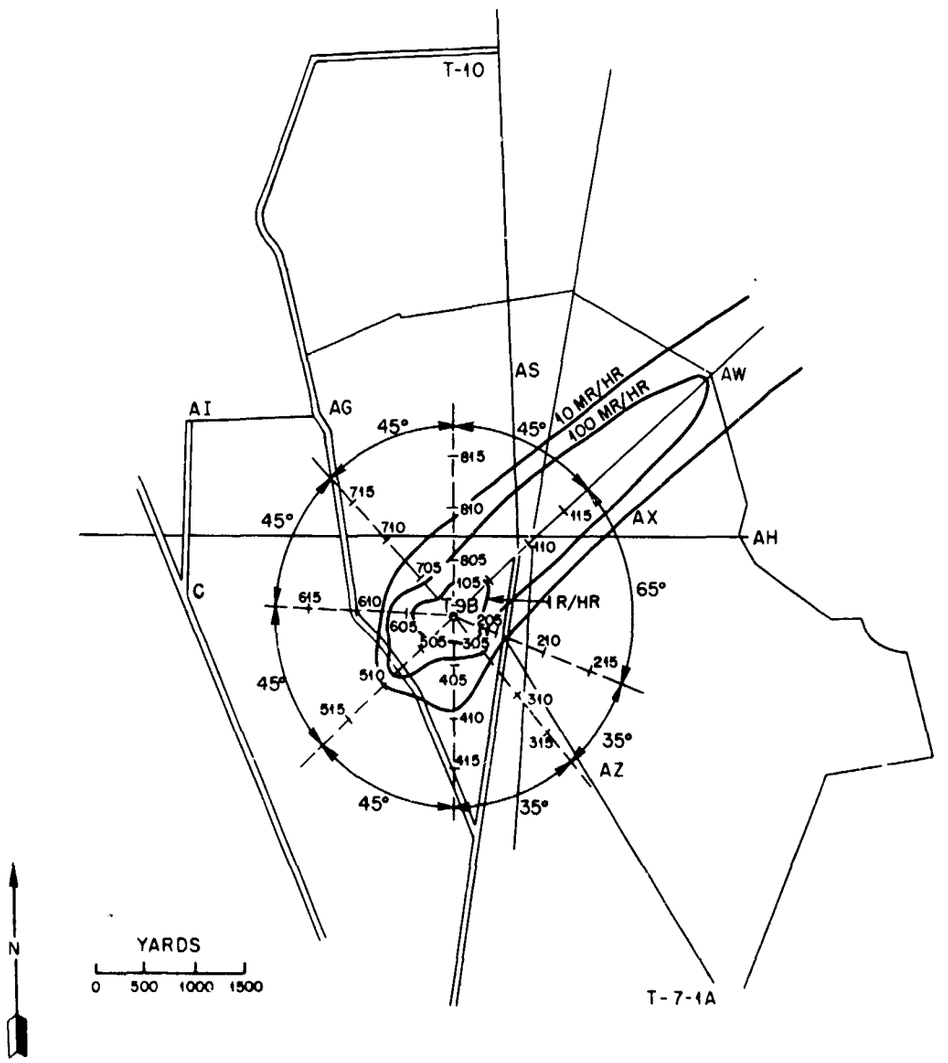


Fig. 3.15—Resurvey 4, Tesla. Area, T-9b; date, 8 March 1955; survey time, 0700 to 0800 hr.

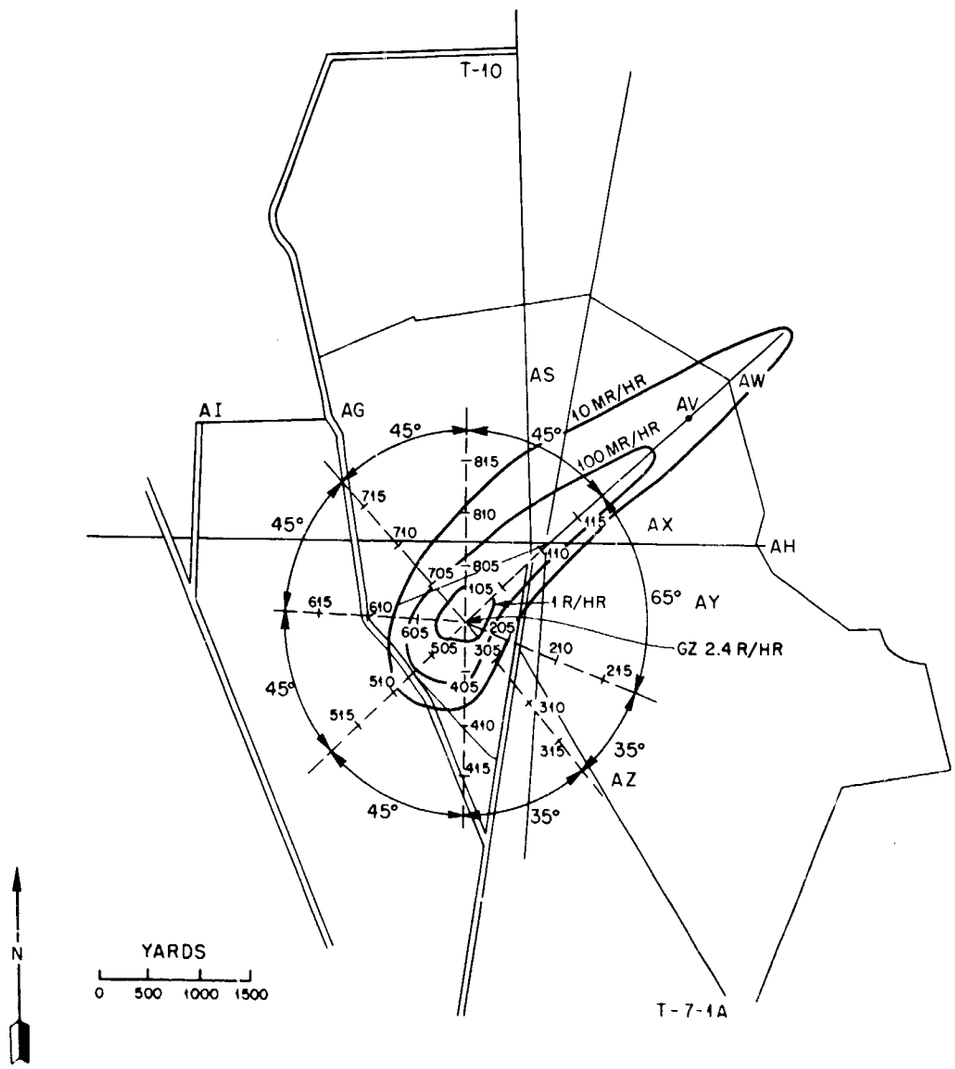


Fig. 3.16 — Resurvey 5, Tesla, Area, T-9b; date, 16 March 1955; survey time, 0710 to 0745 hr.

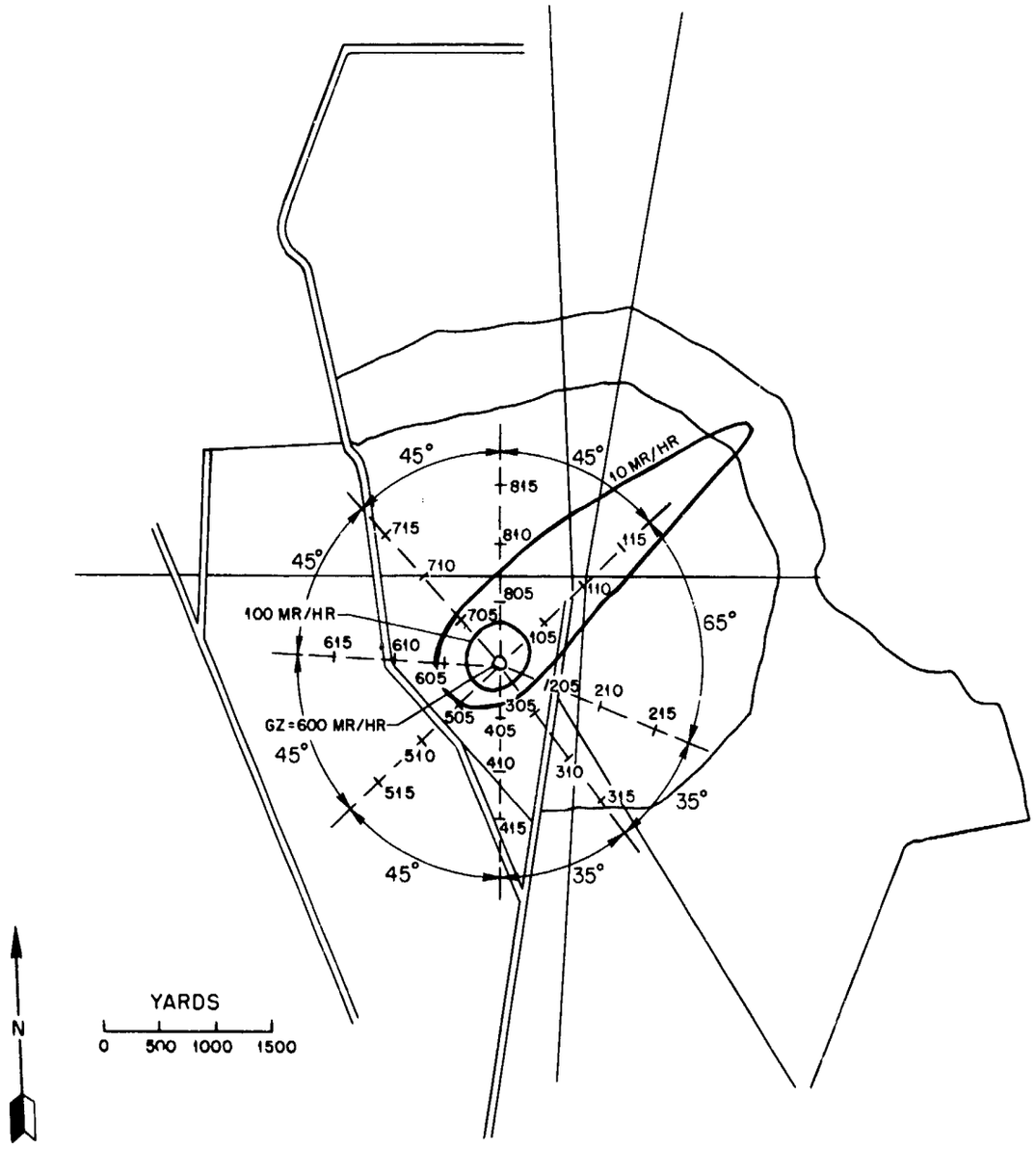


Fig. 3.17—Resurvey 7, Tesla. Area, T-9b; date. 4 May 1955; survey time, 1040 to 1110 hr.

Table 3.10—RESULTS OF SURVEYS, TURK

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey, 7 March 1955			
404.2	10,000	0836	411.5	1,000	0736
536.0	10,000	0855	325.0	100	0756
235.0	10	0635	729.0	10	0745
220.0	100	0637	309.0	1,000	0802
0.05 mile toward GZ from 2-300	1,000	0646	304.7	10,000	0815
			715.0	100	0755
0.15 mile toward GZ from 2-300	10,000	0647	709.0	1,000	0800
			707.0	10,000	0802
Station 2-300	600	0645	632+	1,000	0820
9800 ft az. 32° from T-2	1,000	0715	606	10,000	0830
			606	10,000	0909
129.0	10	0718	612	1,000	0912
114.0	100	0721	914	100,000	0721
107.7	1,000	0723	933	10,000	0716
104.2	10,000	0725	936	1,000	0715
447.8	10	0715	943	100	0714
429.9	100	0723			
		Resurvey 1, 8 March 1955			
223.0	10	0640	302.7	10,000	0716
208.7	100	0643	938.0	100	0650
203.4	1,000	0647	930.0	1,000	0651
201.7	10,000	0650	503.4	10,000	0700
135.0	10	0657	535.0	1,000	0702
108.7	100	0701	543.0	100	0707
105.2	1,000	0703	551.8	10	0712
103.4	10,000	0704	716.5	10	0708
427.0	10	0651	706.5	100	0710
409.3	100	0700	704.7	1,000	0712
405.4	1,000	0701	703.0	10,000	0713
403.7	10,000	0702	609.2	100	0759
320.8	10	0712	604.0	1,000	0802
306.7	100	0714	602.2	10,000	0804
303.6	1,000	0715			
		Resurvey 2, 9 March 1955			
606	10,000	1048	937.8	10	1120
607	1,000	1037	908.6	1,000	1110
608	100	1034	415.1	10	0910
536	480	1111	502.0	10,000	0914
213.2	10	0900	519.0	1,000	0910
206.2	100	0901	619.0	100	0904
202.7	1,000	0903	927.3	1,000	0852
200.9	100,000	0904	935.5	100	0855
110.5	10	0915	539.5	100	0939
107.0	100	0917	548.3	10	0942
103.4	1,000	0918	406.8	100	0913
101.7	10,000	0920	404.2	1,000	0914
712.0	10	1020	402.4	10,000	0915
706.7	100	1024	310.2	10	0923
705.0	1,000	1026	305.0	100	0925
703.2	10,000	1027	303.2	1,000	0927
931.0	100	1117	302.3	10,000	0930

Table 3.10 — (Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 3, 12 March 1955			
935	10	1445	404.7	100	1350
929.7	100	1446	402	1,000	1351
907	100	1452	307	10	1344
906.5	10	1453	303	100	1345
915	600	1450	301.7	1,000	1346
916	650	1450	206	10	1339
918	800	1448	202.5	100	1341
920	450	1448	201.7	1,000	1342
921	280	1447	106	10	1225
0.5 mile from 536 on road to 619	1,000	1204	102.5	100	1227
			101	1,000	1228
1.5 miles from 536 on road to 619	100	1210	704	10	1230
			702	100	1231
2.0 miles from 536 on road to 619	10	1215	701	1,000	1232
			619	10	1215
536	10	1200	605	100	1217
410	10	1349	602.5	1,000	1218
			GZ	10,000	1219
		Resurvey 4, 25 March 1955			
932.5	10	1107	1.5 miles on road N from 536 to 619	100	1145
922.5	100	1109			
GZ	1,200	1112	2 miles on road N from 536 to 619	10	1148
0.1 mile from GZ toward line 6	1,000	1113	0.1 mile from GZ to stake line 2	1,000	1155
0.25 mile from GZ toward line 6	100	1115	0.2 mile from GZ to stake line 2	100	1155
0.3 mile from GZ toward line 6	10	1116	0.3 mile from GZ to stake line 2	10	1156
912	100	1128			
918.5	250	1129	0.1 mile from GZ to stake line 4	1,000	1157
522	100	1136			
200 yd on road N from 536 to 619	10	1134	0.2 mile from GZ to stake line 4	100	1157
0.45 mile on road N from 536 to 619	100	1137	0.7 mile from GZ to stake line 4	10	1200
1 mile on road N from 536 to 619	350	1140			
		Resurvey 5, 12 April 1955			
930	10	1013	101.8	1,000	1030
612	10	1014	Sta. 900	0	1005
607	100	1014	205	10	1006
602.8	1,000	1015	203.9	100	1007
GZ	2,000	1015	202	1,000	1008
704.3	10	1020	305	10	1009
703.5	100	1021	303.5	100	1010
701.8	1,000	1022	201.8	1,000	1010
105	10	1028	506	10	1035
104	100	1029	Sta. 380	10	1040

Table 3.10 — Continued

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 6, 20 April 1955			
930.4	10	1535	280 yd N of T-2	100	1552
612	10	1540	350 yd E of T-2	100	1555
320 yd W of T-2	10	1543	530 yd E of T-2	10	1557
300 yd W of T-2	100	1545	280 yd S of T-2	100	1605
GZ T-2	1,000	1547	880 yd S of T-2	10	1607
350 yd N of T-2	10	1550			
		Resurvey 7, 4 May 1955			
605	10	1001	702	100	1012
603.5	100	1002	406	10	1017
GZ	800	1003	402	100	1019
202.5	100	1005	927.5	10	1025
204.5	10	1006	907	10	1031
703	10	1011			

Table 3.11—HELICOPTER DATA, TURK

Location	Intensity (T1B), mr/hr	Probe intensity, mr/hr	Altitude above terrain, ft	Time	Computed ground reading,* mr/hr
		Initial Survey, 7 March 1955			
Area 1		Clear	500	0558	
Area 3		Clear	500	0625	
Area 7		Clear	500	0629	
Area 9		Clear	500	0631	
Area 10		Clear	500	0634	
Area 4		Clear	500	0638	
B (11,000 ft az. 90° from T-4)		Clear	410	0645	
C (8200 ft az. 276° from T-9b)	0	7	420	0648	0
D (11,200 ft az. 90° from T-1)	0	7	410	0650	0
E (10,600 ft az. 33° from T-1)	0	1	490	0653	
F (15,700 ft az. 270° from T-10)		Clear	500	0655	
G (3000 ft az. 335° from T-1)	80	1300	430	0700	700
H (3600 ft az. 299° from T-1)	50	400	420	0702	435
I (9300 ft az. 286° from T-1)	160	900	380	0703	1,152
J (3000 ft az. 265° from T-2)	1800	8500	380	0714	12,420
L (2930 ft az. 85° from T-2)	400	700	390	0720	3,040

*Computed ground reading taken from "Correlation Curves for Air to Ground Readings," 3 April 1953, Operation Upshot-Knothole Rad-Safe Report WT-817, Chap. 14.

Table 3.12—MISCELLANEOUS READINGS, TURK

Location	Intensity, mr/hr	Time
	Initial Survey, 7 March 1955	
Rad-Safe Building (roof)	0	0539
Building 10	0	0540
Rad-Safe Building (roof)	0	0542

Table 3.[illegible] (Continued)

Location	Intensity, mr/hr	Time
Initial Survey, 7 March 1955		
Main road at CP area	0	0543
Well 5B main access road, F. Flat	0	0545
Rad-Safe Building (roof)	0	0546
Rad-Safe Building (roof)	0	0550
Helicopter pad	0	0553
Rad-Safe Building (roof)	0	0553
Between Y junction and CP area	0	0600
Rad-Safe Building (roof)	0	0615
GZ, F. Flat	.4	0606
GZ, T-4		0620
B (11,000 ft az. 90° from T-4)	0	0610
Well 5B main access road, F. Flat	0	0606
Stake 825, F. Flat	0	0619
Stake 725, F. Flat	0	0625
GZ, F. Flat	0.6	0631
GZ, F. Flat	0.4	0718
Stake 236, T-2	8	0637
T-4	5	0638
Stake 236, T-4	8	0640
AD (1860 ft az. 280° from T-4)	20	0643
0.1 mile W of T-4 along stake line 6 of T-4	10	0647
L (2930 ft az. 85° from T-2)	600	0651
2500 yd N of GZ, F. Flat	0	0653
Rad-Safe Building (front)	0	0615–0715
Area 9c	0	0730
BU (11,700 ft az. 231° from T-4)	10	0847
BT (14,400 ft az. 245° from T-4)	100	0847
2.5 miles W of T-1	10	0815
BS (15,100 ft az. 290° from T-1)	100	0824
BT (14,400 ft az. 245° from T-4)	100	0829
Sta. 4-357	300	0832
BR (9300 ft az. 285° from T-4)	1,000	0840
Y (10,550 ft az. 124° from T-2)	39	0753
Half-way between Y and Mercury highway	10	0813
J (3000 ft az. 265° from T-2)	4,300	0930
Stake line 608.2 of T-4	10	0655
Stake lines 603 to 618 of T-4	10	0715
Stake lines 620 to 630 of T-4	100	0715
Stake line 636 of T-4	250	0725
0.5 mile S of stake line 5 of T-2		
150 yd S of J on stake line 9	10,000	0915
0.1 mile W of T-4	10	0645
L (2930 ft az. 85° from T-2)	120	0645
AB (9800 ft az. 58° from T-2)	10	0655
AC (T-4)	4.5	0642
AD (1860 ft az. 280° from T-4)	2.0	0645
1.1 miles N of AD	10	0648
From stake 930 of stake line (T-2) to check point J (highest reading)	8,000	0655
0.2 mile S along Desert Rock Road from stake line 6 of T-2	100	0815
0.4 mile S along Desert Rock Road from stake line 6 of T-2	1,000	0820
1.9 miles S along Desert Rock Road from stake line 6 of T-2	1,000	0830

Table 3.1 — (Continued)

Location	Intensity, mr/hr	Time
Resurvey 2, 9 March 1955		
0.1 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	38	1040
0.2 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	90	1046
0.3 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	260	1048
0.4 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	700	1050
0.5 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	800	1052
0.6 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	1,100	1054
0.7 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	800	1055
0.8 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	1,200	1056
0.9 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	1,800	1057
1.0 mile S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	2,500	1058
1.1 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	2,800	1059
1.2 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	3,200	1100
1.3 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	3,600	1101
1.4 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	3,600	1102
1.5 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	3,000	1103
1.6 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	2,400	1104
1.7 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	1,700	1105
1.8 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	1,200	1106
1.9 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	600	1107
2.0 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	600	1108
2.1 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	600	1109
2.2 miles S of junction of stake line 6 and Desert Rock Road along Desert Rock Road	420	1110
AD (1860 ft az. 280° from T-4)	1	0900
0.1 mile N AD (due N along road)	1.2	0905
0.2 mile N AD (due N along road)	1.2	0907
0.3 mile N AD (due N along road)	1.4	0908
0.4 mile N AD (due N along road)	1.4	0910
C (8200 ft az. 276° from T-9b)	0	0850
D (11,200 ft az. 90° from T-1)	1.0	0859
L (2930 ft az. 85° from T-2)	60	0907
AB (9800 ft az. 58° from T-2)	3.0	0910
Y (10,550 ft az. 124° from T-2)	1.8	0920
J (3000 ft az. 265° from T-2)	160	0903
T-4 GZ	2	0850

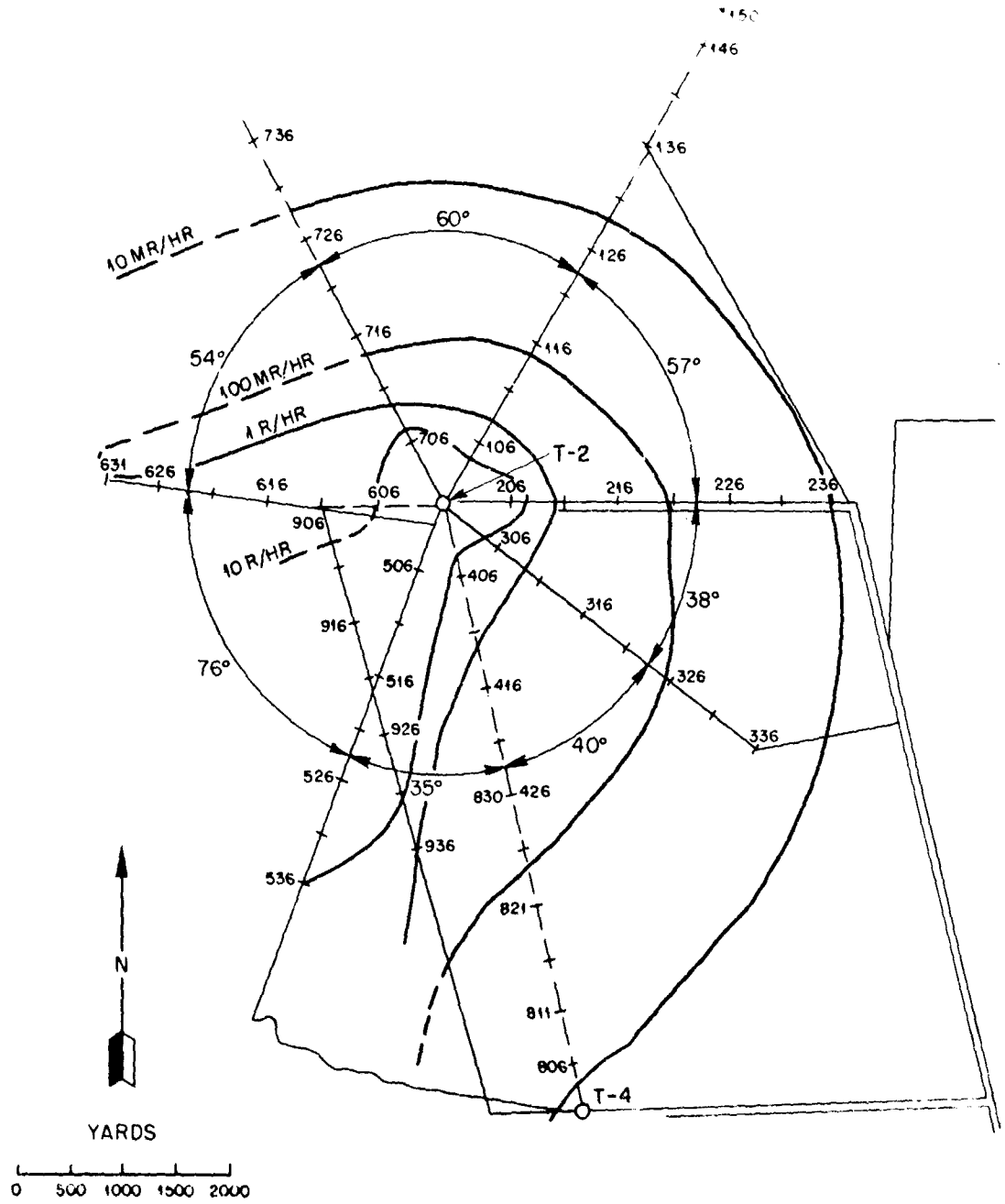


Fig. 3.18—Initial survey, Turk. Area, T-2; date, 7 March 1955; survey time, 0645 to 0815 hr.

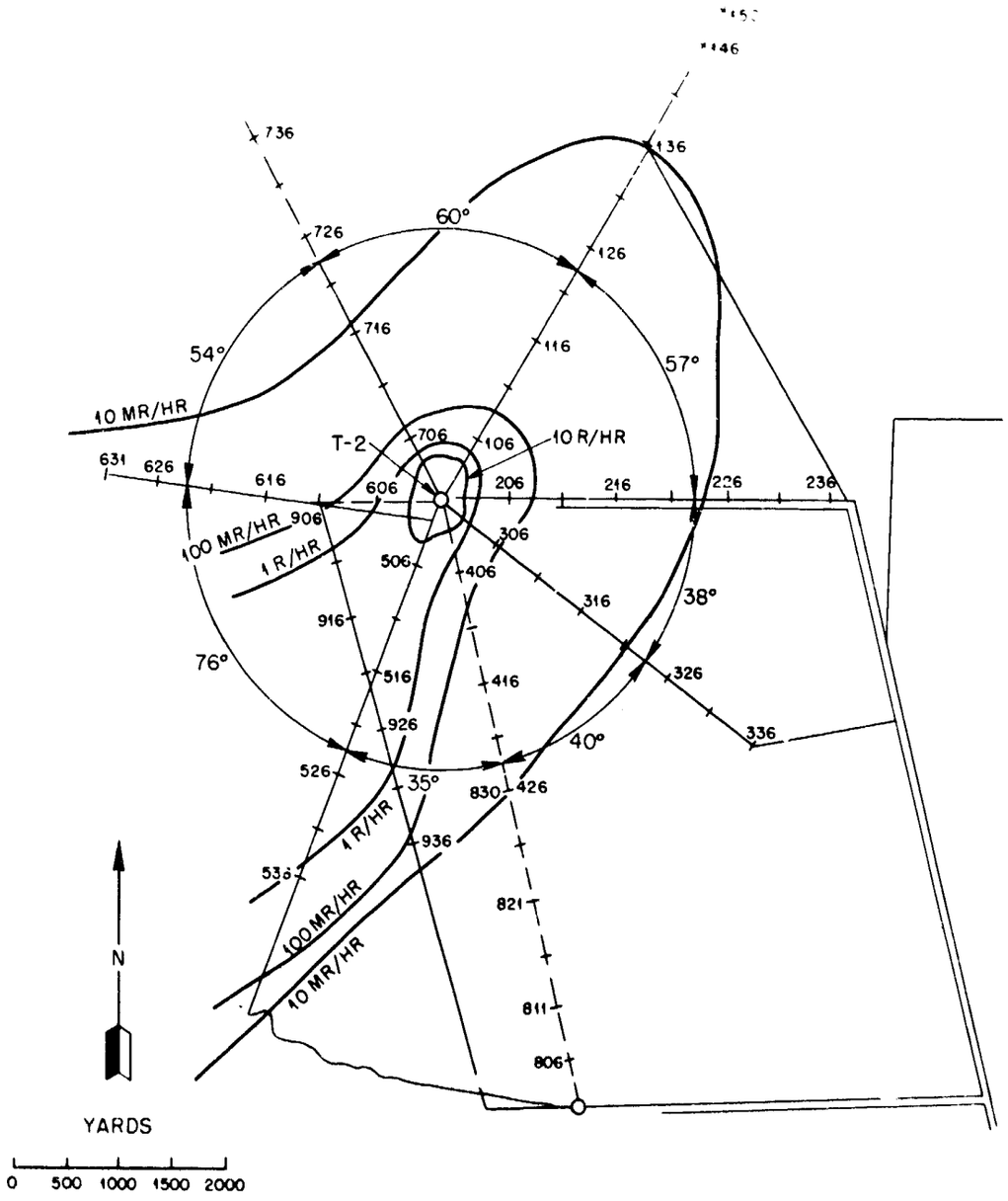


Fig. 3.19—Resurvey 1, Turk. Area, T-2; date, 8 March 1955; survey time, 0630 to 0800 hr.

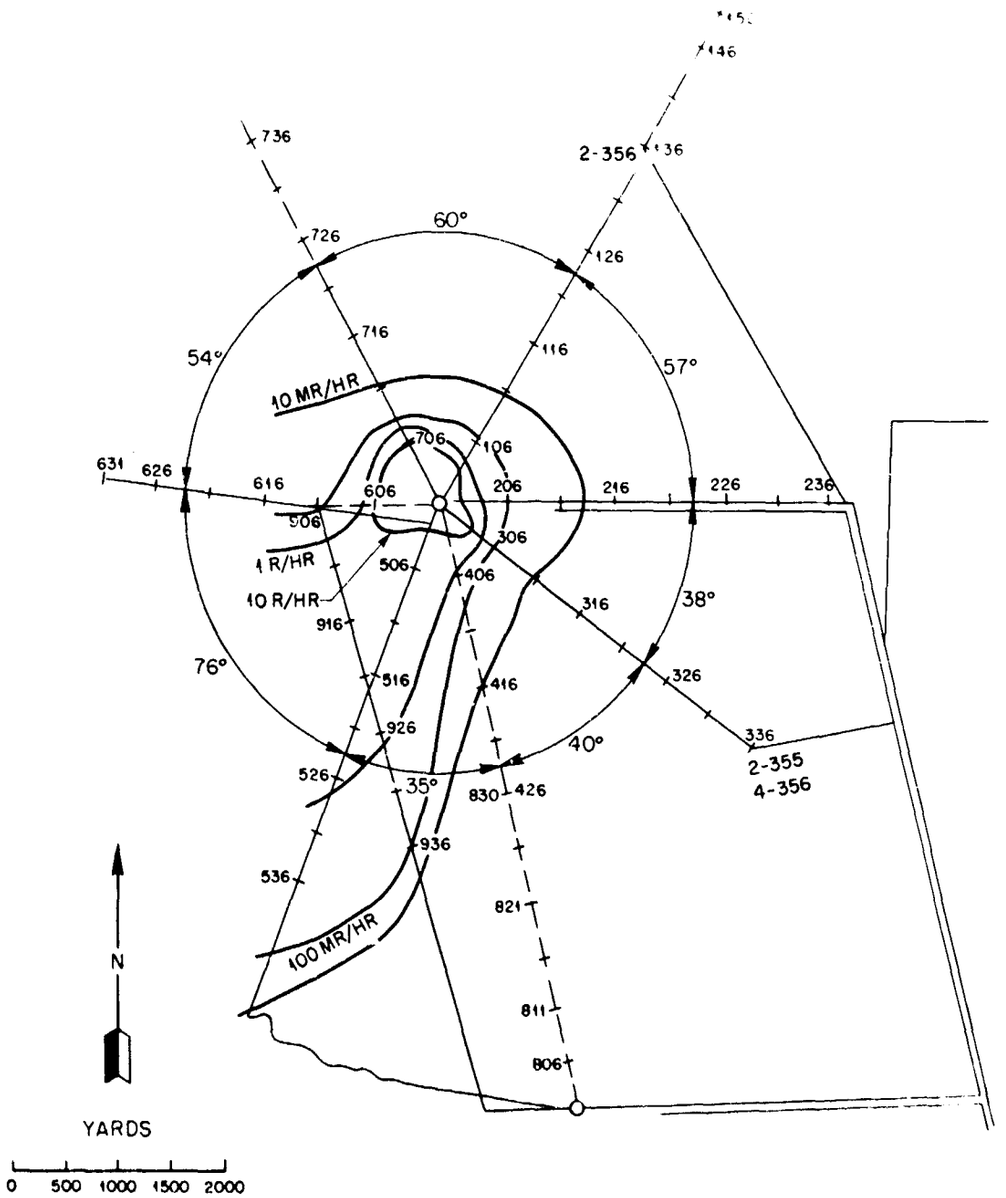


Fig. 3.20—Resurvey 2, Turk. Area, T-2; date, 9 March 1955; survey time, 0900 to 1120 hr.

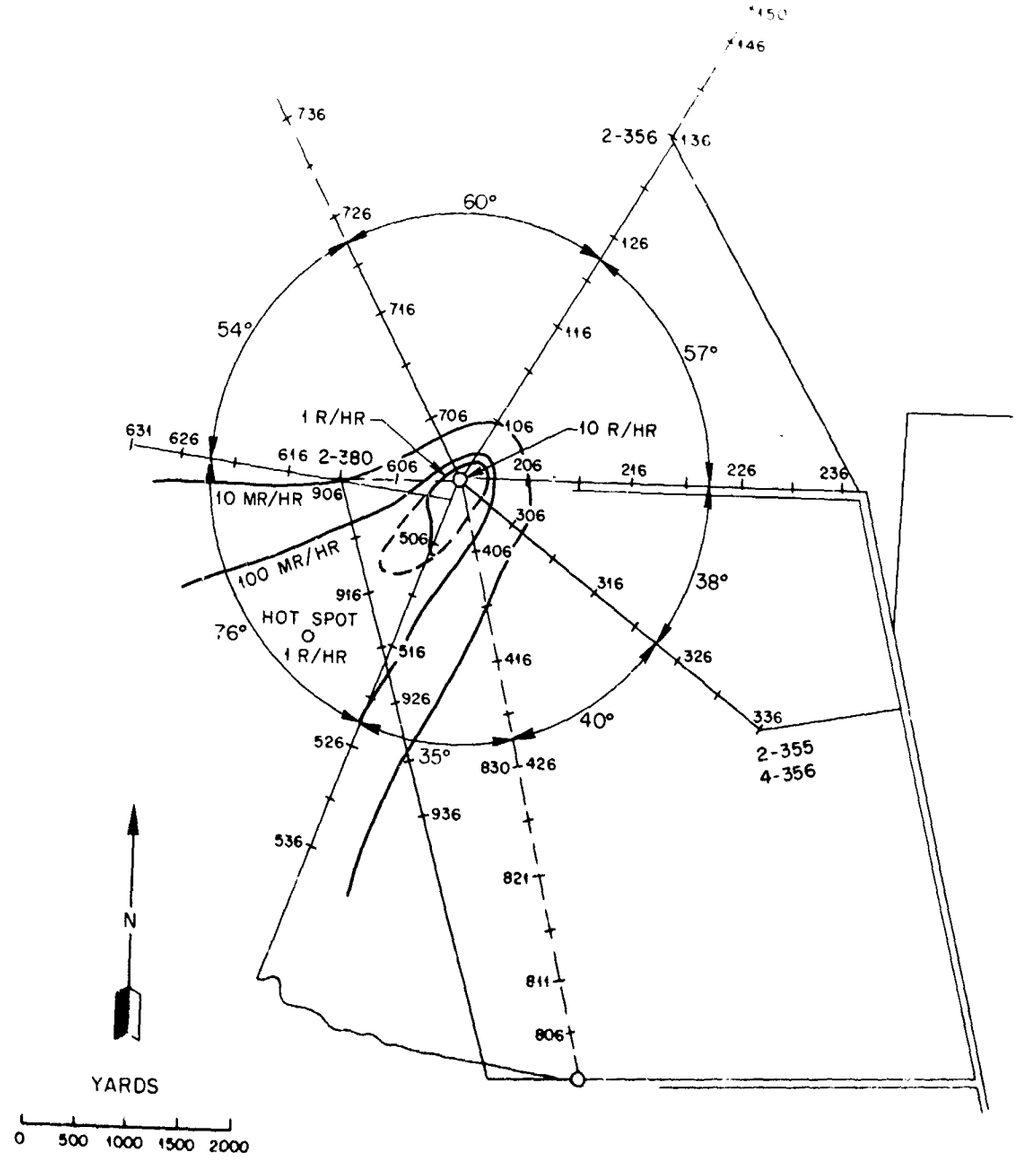


Fig. 3.21 —Resurvey 3, Turk, Area, T-2; date, 17 March 1955; survey time, 1200 to 1500 hr.

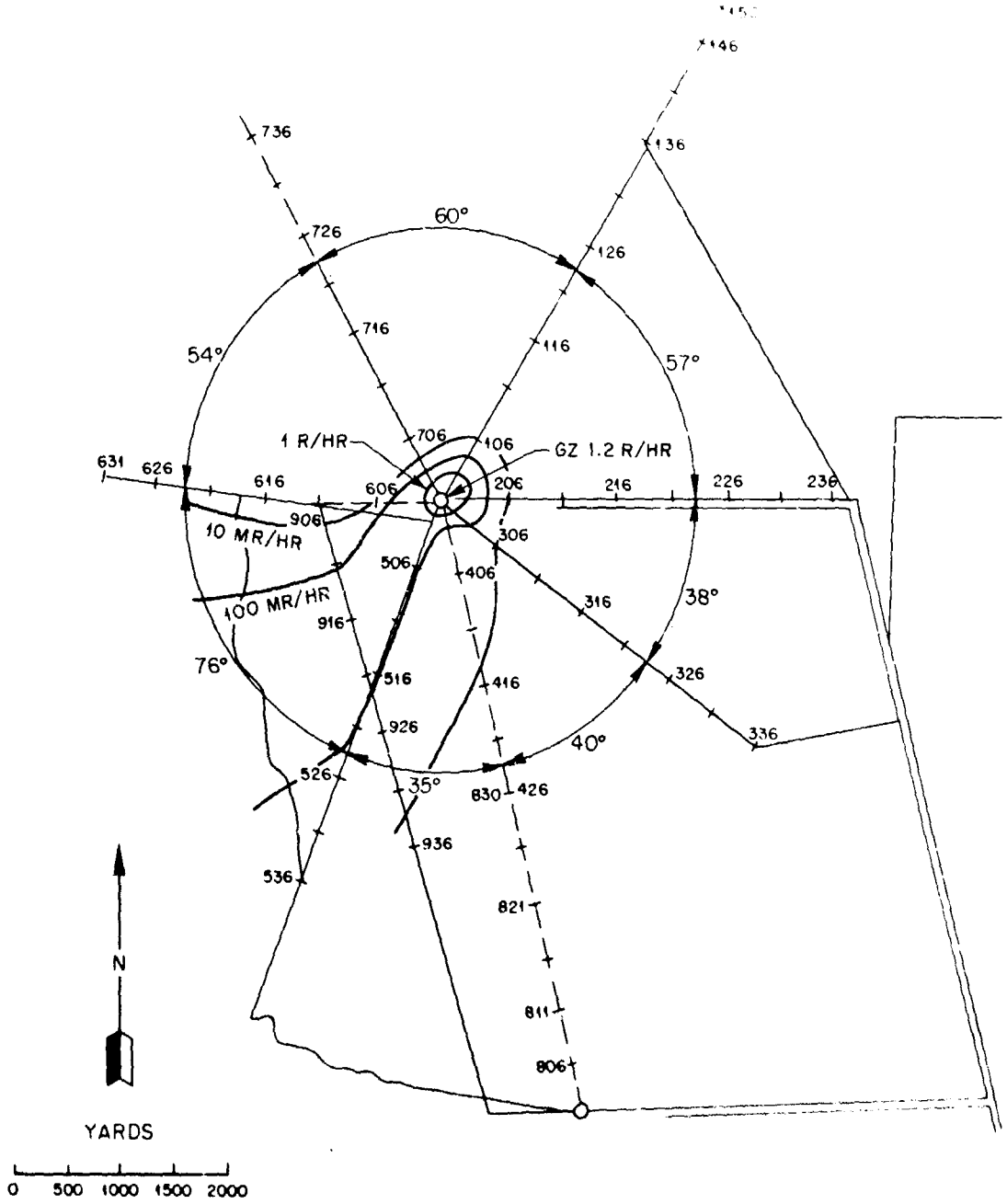


Fig. 3.22—Resurvey 4, Turk. Area, T-2; date, 25 March 1955; survey time, 1107 to 1200 hr.

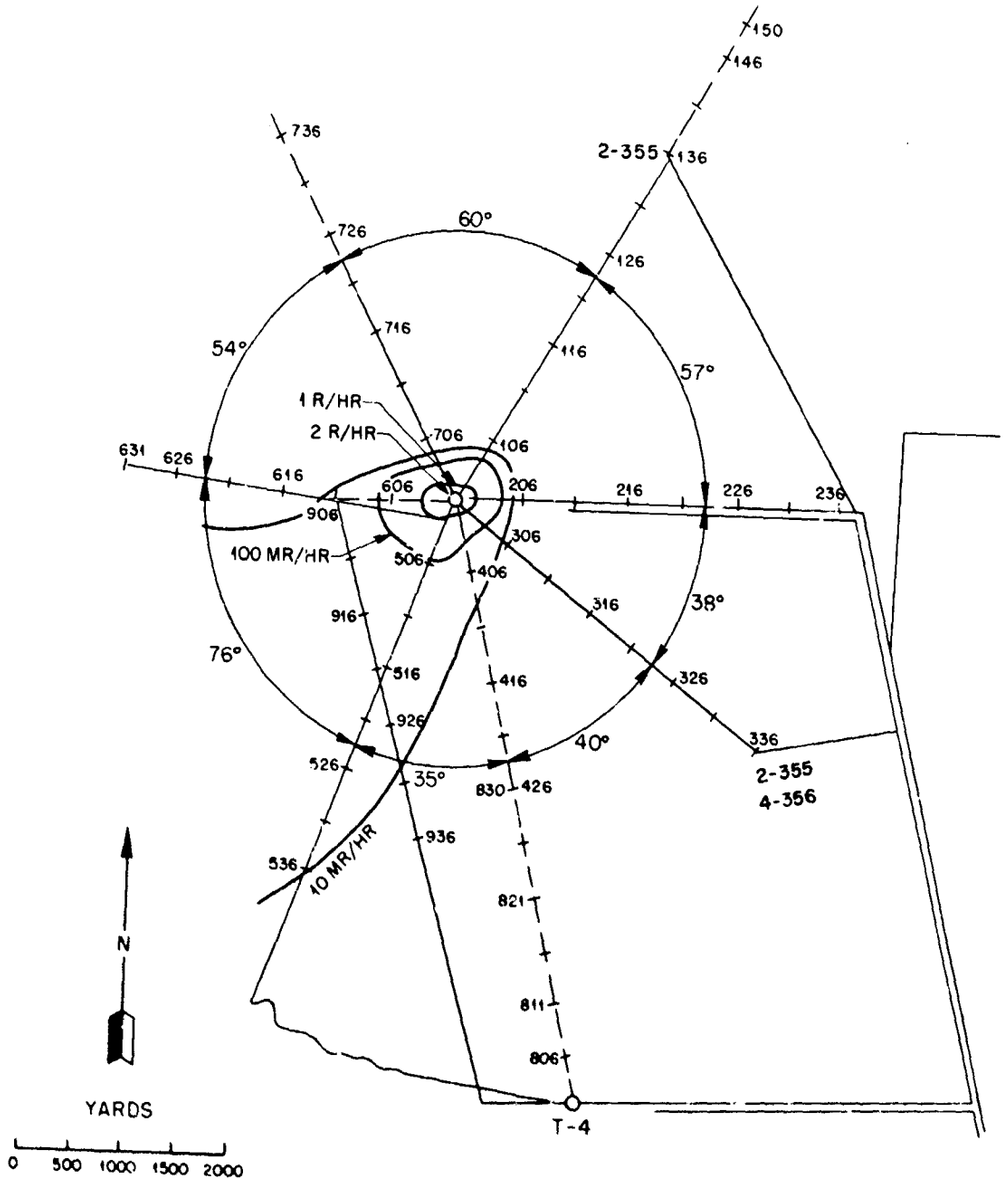


Fig. 3.23—Resurvey 5. Turk. Area, T-2; date, 12 April 1955.

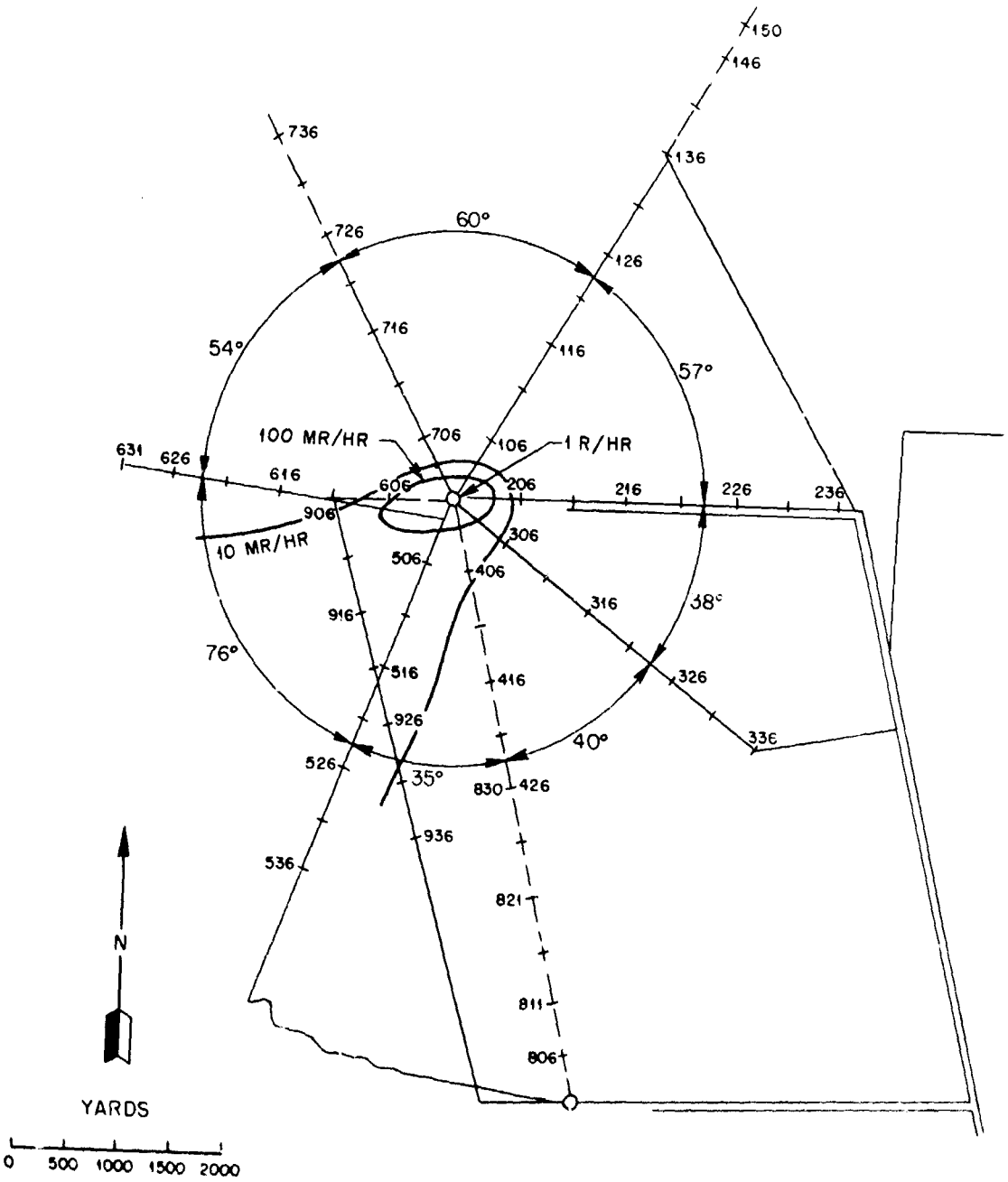


Fig. 3.24—Resurvey 6, Turk. Area, T-2; date, 20 April 1955.

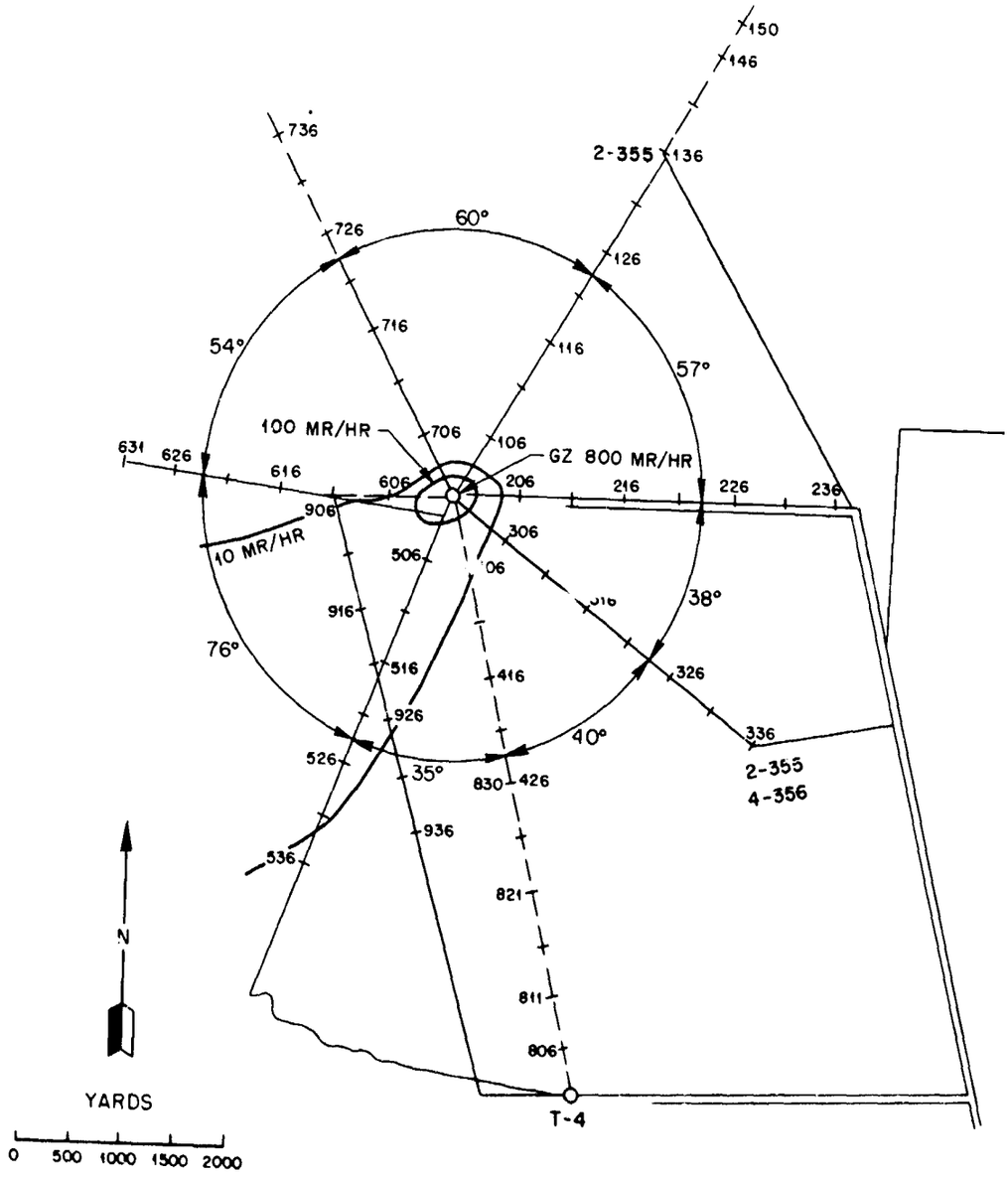


Fig. 3.25—Resurvey 7, Turk. Area, T-2; date, 4 May 1955; survey time, 1001 to 1031 hr.

Four parties of Project 39.7 and one Reynolds Electric and Engineering Company working party were authorized entry prior to R-hour. Four other participating projects, one from Program 12, and Projects 2.7a, 14.1, and 18.5, were also authorized entry to Area 3a, prior to R-hour, by the Test Director. Project 39.7 was granted permission to enter the area above the 10 r/hr line by the Test Director.

R-hour was declared at 0655 hr. A high reading of 40 r/hr was reported 300 yd south of Ground Zero. Prevailing westerly winds resulted in a very acceptable isointensity pattern, which ran into the hills to the east.

On shot day the Plotting and Briefing Section briefed 34 parties from 18 participating projects. The following parties were briefed for entry into the Hornet area: on 15 March, four parties; 16 March, one party; 17 March, two parties; 18 March, one party; 19 March, one party; and 20 March, one party. Thirty-one additional parties were released into other contaminated areas during this period.

Survey data are shown in Tables 3.13 to 3.15. Isointensity plots are shown in Figs. 3.26 to 3.32.

3.7 SHOT BEE

The initial survey party, road patrols, and check point personnel were given a final briefing at 0430 hr. The device was detonated at 0505 hr, 22 March 1955, on a 500-ft tower in Area 7-1a.

The initial survey team, road patrols, and check point personnel were dispatched at 0507 hr. The actual ground survey began at 0540 and was completed at 0640 hr. The helicopter survey team departed from the Control Point area at 0507 hr and at 0626 hr had completed the survey. All check point personnel were in position at 0545 hr. The Test Director declared R-hour at 0644 hr.

On shot day the Plotting and Briefing Section briefed 24 parties and participating projects for access to the Bee area. Project 39.7 and one Reynolds Electric and Engineering Company working party were authorized entry prior to R-hour. Project 39.7 was granted permission to enter areas with radiation levels above 10 r/hr.

The following parties were briefed for entry into the Bee area: on 23 March, 13 parties; 24 March, 23 parties; and 25 March, 4 parties.

Survey data are shown in Tables 3.16 to 3.18. Isointensity plots are shown in Figs. 3.33 to 3.36.

3.8 SHOT ESS

Shot Ess, scheduled for 0900 hr, 23 March 1955, in Area 10 was detonated at 1230 hr after numerous postponements caused by changing wind directions.

At 0730 hr the initial survey teams, road patrols, and check point personnel were dispatched after briefing, to the "Y" junction, which had been designated as their observation and assembly point. To follow the direction of the cloud, a patrol was sent north on the left fork of the "Y" junction to the Ess area directly after the detonation. A second patrol was established to the east of Yucca Flat at coordinates E910–N995, on Fig. 3.37. After these patrols indicated that the cloud was traveling east, the survey teams and check points were dispatched to their respective areas. First readings were obtained by the survey teams at 1310 hr. The survey was essentially completed at 1450 hr.

The officer in charge of the helicopter reported on the Ground Zero runs as follows: The helicopter survey, which was in two phases, is described in some detail in Chap. 4, Sec. 2.8.1, the monitoring report for this shot. On the Ground Zero run the survey team started the first run in from 1¼ miles northwest of Ground Zero at 1425 hr. As the probe reached a point ½ mile from Ground Zero and 300 ft above ground, the reading was 200 r/hr. From this point on, readings rose rapidly. With the probe 300 ft above the ground over the crater, the reading

(Text continues on page 91.)

Table 3.13—RESULTS OF SURVEYS, HORNET

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey, 12 March 1955			
H17.1	10	0555	F03.5	10,000	0605
H11.0	100	0557	D03.8	10,000	0616
H08.8	1,000	0605	D06.1	1,000	0617
H05.0	10,000	0608	D09.5	100	0618
C23.6	10	0609	D13.7	10	0620
C11.1	100	0615	D02	40,000	0600
C06.9	1,000	0617	F19.5	10	0559
C03.9	10,000	0619	F10.0	100	0601
B41.3	2,000	0640	F06.9	1,000	0602
B28.0	1,000	0646	F04.0	10,000	0604
B03.2	10,000	0649	G04.0	10,000	0620
B18 to B14	350		G06.1	1,000	0623
E36	0	0555	G09.5	100	0625
E16.2	10	0559	G14.0	10	0628
E10.3	100	0602	B11.0	1,000	0648
E06.3	1,000	0604			
		Resurvey 1, 13 March 1955			
B11	10	0707	F05.9	1,000	0557
B07.5	100	0712	F01.1	10,000	0559
B05.4	1,000	0713	G01.0	10,000	0610
B02.5	10,000	0715	G04.5	1,000	0612
B36.0	40	0730	G07.7	100	0616
C10.0	10	0749	G10.1	10	0618
C06.3	100	0751	Sta. 3-300	14	0614
C03.9	1,000	0754	0.1 mile on road S from stake 117	10	0713
C02.2	10,000	0755			
H09.9	10	0653	0.5 mile on road S from stake 117	100	0715
Sta. 3-330	14	0655			
H06.4	100	0656	0.8 mile on road S from stake 117	1,000	0719
H04.0	1,000	0657			
H02.1	10,000	0659	0.4 mile from stake 204 toward GZ	10,000	0732
E10.1	10	0655			
E06.8	100	0657	0.8 mile S from Sta. 3-356 (10,400 ft az. 44° from T-3)	10	0743
E03.7	1,000	0659			
E02.0	10,000	0700			
D02.1	10,000	0702	0.9 mile S from Sta. 3-356 (10,400 ft az. 44° from T-3)	100	0745
D04.6	1,000	0704			
D06.8	100	0706			
D10.8	10	0708	1.3 miles S from Sta. 3-356 (10,400 ft az. 44° from T-3)	1,000	0746
F09.5	10	0553			
F06.7	100	0555			
		Resurvey 2, 16 March 1955			
B10.28	10,000	0643	Bunker W*	1	0643
B08.52	1,000	0644	Bunker 3-300	1	0643
B06.76	100	0642	Bunker 3-330	1	0645
B06.3	10	0647	Stake line B + 0.5 mile N on BK–BJ	10	0634
C06.2	10	0631			
C04.88	100	0632	Stake line B + 0.2 mile N on BK–BJ	100	0636
C08.64	1,000	0633			
C07.52	10,000	0634	0.15 mile N on on BK–BJ	200	0638
GZ	10,000	0652			

Table 3.13 — (Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 2, 16 March 1955			
D02.36	1,000	0654	0.2 mile N on BK–BJ	10	0636
D03.8	100	0656			
D06.4	10	0650	Stake line 2+0.5 mile N on BK–BJ	10	0638
E05.0	10	0635			
E03.8	100	0640	Stake line 2+0.1 mile N on BK–BJ	10	0700
E01.5	1,000	0645			
F05.7	10	0626	Stake line 2+0.15 mile S on BG–BE	100	0701
F03.0	100	0627			
F01.0	1,000	0628	Stake line 2+0.25 mile S on BG–BE	160	0702
F00.5	10,000	0639			
G00.8	10,000	0636	Stake line 2+0.6 mile S on BG–BE	100	0704
G01.0	1,000	0637			
G03.5	100	0638	Stake line B on BG–BE	10	0705
G05.5	10	0640			
H05.5	10	0633			
H03.25	100	0635			
H01.0	1,000	0637			
		Resurvey 3, 25 March 1955			
E02.5	10	1055	G00.6	1,000	1117
E01.1	100	1057	A02.5	10	1120
E00.6	1,000	1058	B0.43	10	1145
F02.5	10	1103	B01.8	100	1150
F01.1	100	1104	B00.4	1,000	1152
F00.6	1,000	1106	D06.0	10	1302
G02.5	10	1114	D01.5	100	1305
G01.4	100	1115	411.0	10	1310
		Resurvey 4, 12 April 1955			
D10	10	0840	B05	10	0955
D05 + 0.2 mile	100	0845	Steel N of GZ	2,000	0850
GZ	1,000	0850	Steel W of GZ	1,500	0905
E06 + 0.2 mile	10	0900	Steel S of GZ	2,000	0915
E06 + 0.3 mile	100	0930	Steel E of GZ	2,600	0925
GZ	1,000	0905	Steel NE of GZ	1,400	0959
H05 + 0.05 mile	10	0908	Steel SE of GZ	1,600	0925
H05 + 0.2 mile	100	0911	236	15	0957
B06	10	0920	H17	10	0831
B05 + 0.2 mile	100	0923	H28	20	0835
		Resurvey 5, 20 April 1955			
511.5	10	1400	H00.5	100	1430
D03.3	10	1410	25-ft radius around T-3	100	1431
D01.5	100	1413			
GZ	1,000	1415	GZ, T-3	750	1432
B05	10	1420	225	10	1440
B00.5	100	1423	0.6 mile S on road from 225	10	1445
H01	10	1428			

Table 3.13—(Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 6, 4 May 1955			
E02.8	10	1200	400.8	100	1227
E01.8	100	1201	GZ, Moth (earth)	300	1228
GZ (earth)	800	1202	GZ, Moth (steel)	450	1228
GZ (steel)	1,000	1202	602	10	1233
D02.5	10	1206	601	100	1234
D01	100	1207	802.6	10	1241
B04.2	10	1212	801	100	1242
B01	100	1213	302.3	10	1247
G03	10	1220	301	100	1248
G01.5	100	1221	0.2 mile S of 225	10	1259
402	10	1226	0.4 mile S of 225	10	1300

*W (2000 ft az. 265° from T-3); BG (10,400 ft az. 44° from T-3); BE (10,000 ft az. 119° from T-3a); BK (6200 ft az. 59.5° from T-3a); and BJ (5600 ft az. 158° from T-3a).

Table 3.14—HELICOPTER DATA, HORNET

Location	Intensity (T1B), mr/hr	Probe intensity, mr/hr	Altitude above terrain, ft	Time	Computed ground reading,* mr/hr
		Initial Survey, 12 March 1955			
Area 1	Clear	Clear	500	0542	
Area 4	Clear	Clear	500	0543	
Area 7	Clear	Clear	500	0545	
S (14,000 ft az. 57° from T-3)	0008	100	500	0602	102.4
X (3000 ft az. 265° from T-3)	0150		420	0638	1305
W (2000 ft az. 265° from T-3)	0130		440	0633	1235

*Computed ground reading taken from "Correlation Curves for Air to Ground Readings," 3 April 1953, Operation Upshot-Knothole Rad-Safe Report WT-817, Chap. 14.

Table 3.15—MISCELLANEOUS READINGS, HORNET

Location	Intensity, mr/hr	Time
	Initial Survey, 12 March 1955	
BO (12,500 ft az. 208° from T-3a)	0	0718
BK (6200 ft az. 59.5° from T-3a)	0	0723
BP (10,000 ft az. 197° from T-3a)	0	0752
BI (12,500 ft az. 315.5° from T-3a)	0	0553
BW (2000 ft az. 97° from T-4)	220	0603
BH (13,500 ft az. 35° from T-3a)	4	0618
BN (13,900 ft az. 70° from T-3a)	4,000	0740
BO (12,500 ft az. 208° from T-3a)	4	0554
BP (10,000 ft az. 197° from T-3a)	30	0557
BM (10,000 ft az. 162° from T-3a)	15	0600
BK (6200 ft az. 59.5° from T-3a)	21	0602
BE (10,000 ft az. 119° from T-3a)	0	0604

Table 3.15—(Continued)

Location	Intensity, mr/hr	Time
Initial Survey, 12 March 1955		
BF (8700 ft az. 118.5° from T-3a)	1,000	0710
BE (10,000 ft az. 119° from T-3a)	0	0715
BK (6200 ft az. 59.5° from T-3a)	10	0716
BM (10,000 ft az. 162° from T-3a)	0	0719
BL (5200 ft az. 203° from T-3a)	14	0608
CC (6200 ft az. 173° from T-3a)	4	0622
BP (10,000 ft az. 197° from T-3a)	4	0630
BO (12,500 ft az. 208° from T-3a)	2	0632
BE (10,000 ft az. 119° from T-3a)	0	0714
A (11,700 ft az. 318° from T-3)	0	0538
BI (12,500 ft az. 315.5° from T-3a)	0	0540
BJ (5600 ft az. 158° from T-7-4)	0	0544
BH (13,500 ft az. 35° from T-3a)	8	0546
BG (10,400 ft az. 44° from T-3)	24	0550
S (14,000 ft az. 57.5° from T-3)	34	0552
BE (10,000 ft az. 119° from T-3a)	0	0715
BO (12,500 ft az. 208° from T-3a)	0	0718
BK (6200 ft az. 59.5° from T-3a)	0	0723
Tower 7-1a	0	0609
321.8 on stake line 3 of T-3	10	0732
316.0 on stake line 3 of T-3	100	0735
312.8 on stake line 3 of T-3	1,000	0738
308.7 on stake line 3 of T-3	10,000	0741
522.8 on stake line 5 of T-3	10	0805
518.2 on stake line 5 of T-3	100	0810
213.8 on stake line 2 of T-3	10,000	0730
225.0 on stake line 2 of T-3	4,000	0725
116.8 on stake line 1 of T-3	10	0628
101.6 on stake line 1 of T-3	100	0637
20 yd S of GZ at T-3 approaching GZ, T-3 from stake 106 of T-3	1,000	0639
370 yd S of GZ at T-3 approaching GZ, T-3 from stake 106 of T-3	10,000	0641
T-9c	0	0630
Area 10	0	0640
S of Area 3	4*	0710
Well 3	2	0706
BO (12,500 ft az. 208° from T-3a)	1	0705
A (11,700 ft az. 318° from T-3)	1	0655
A (11,700 ft az. 318° from T-3)	2	0622
0.4 mile N of BE (10,000 ft az. 119° from T-3a)	10	0716
0.6 mile N of BE (10,000 ft az. 119° from T-3a)	100	0718
BF (8700 ft az. 118° from T-3a)	1,000	0720
0.3 mile N of BF (8700 ft az. 118° from T-3a)	10,000	0728
0.13 mile S of BG (10,400 ft az. 44° from T-3)	10	0717
0.155 mile S of BG	100	0720
1000 ft E of T-3a	16,000	0856
1400 ft E of T-3a	4,000	0858
1900 ft E of T-3a	1,200	0900
Stake 4.6 of T-3	450	0902

* Maximum.

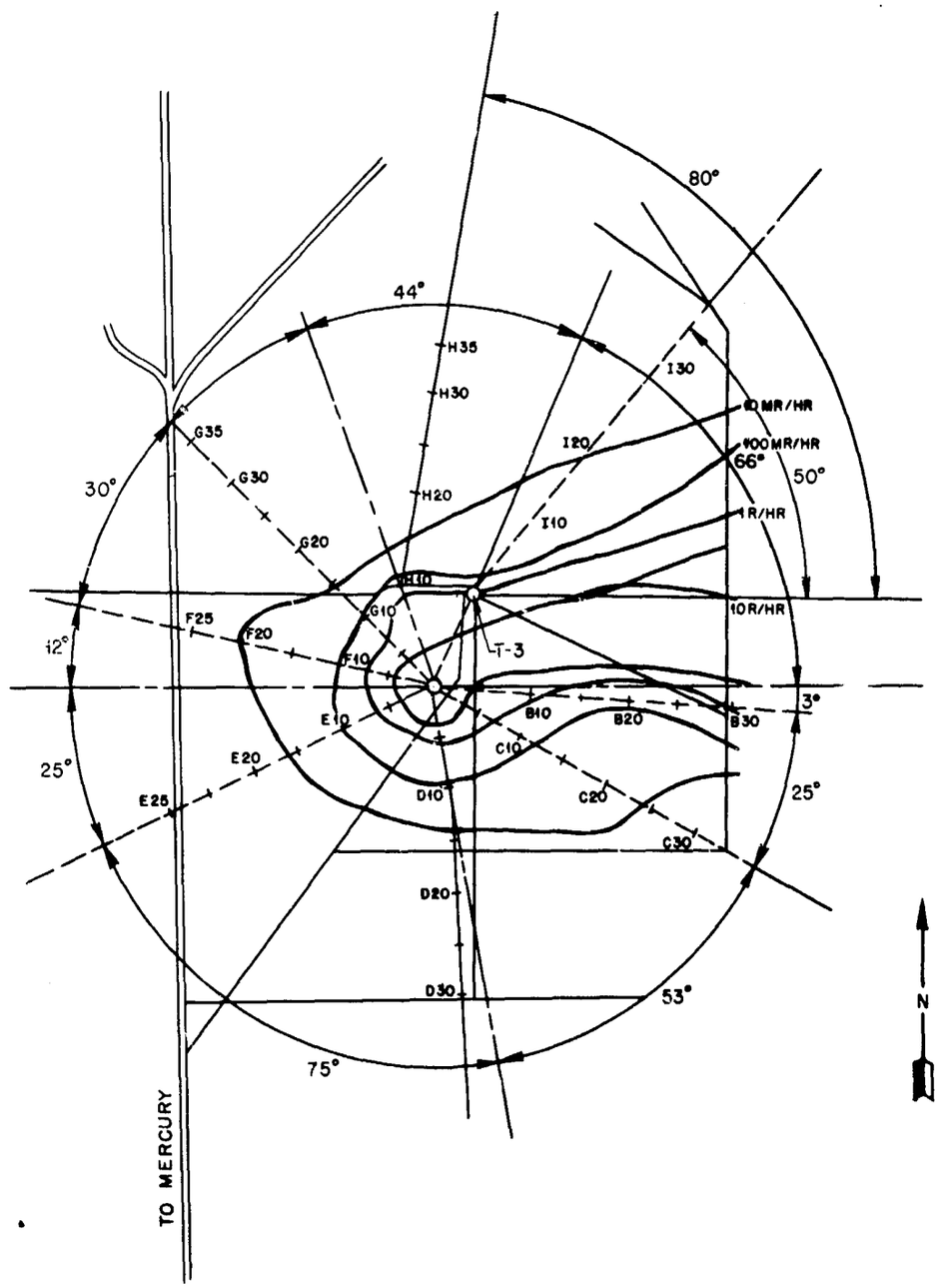


Fig. 3.26—Initial survey, Hornet. Area, T-3a; date, 12 March 1955; survey time, 0546 to 0748 hr.

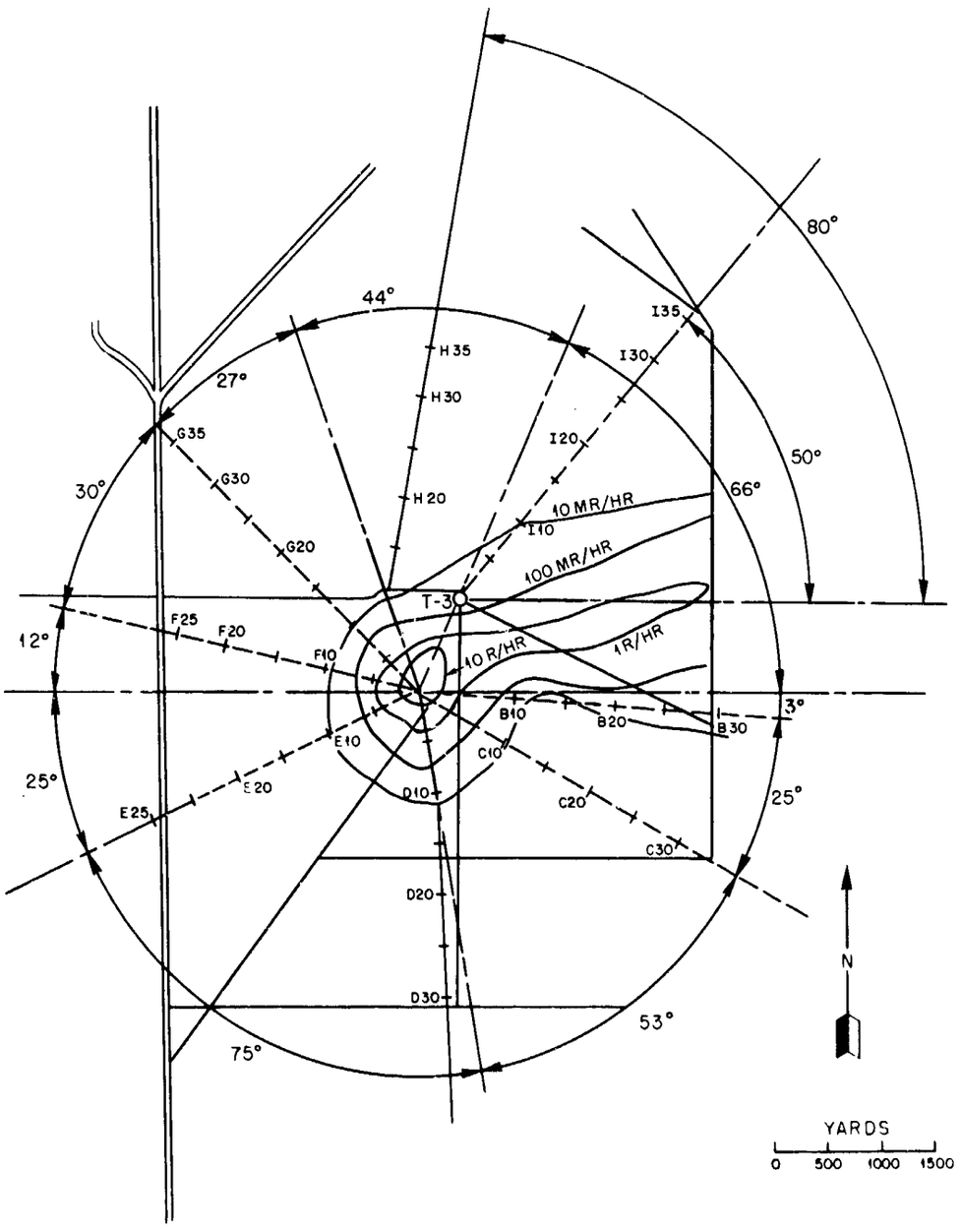


Fig. 3.27—Resurvey 1, Hornet, Area, T-3a; date, 13 March 1955; survey time, 0650 to 0755 hr.

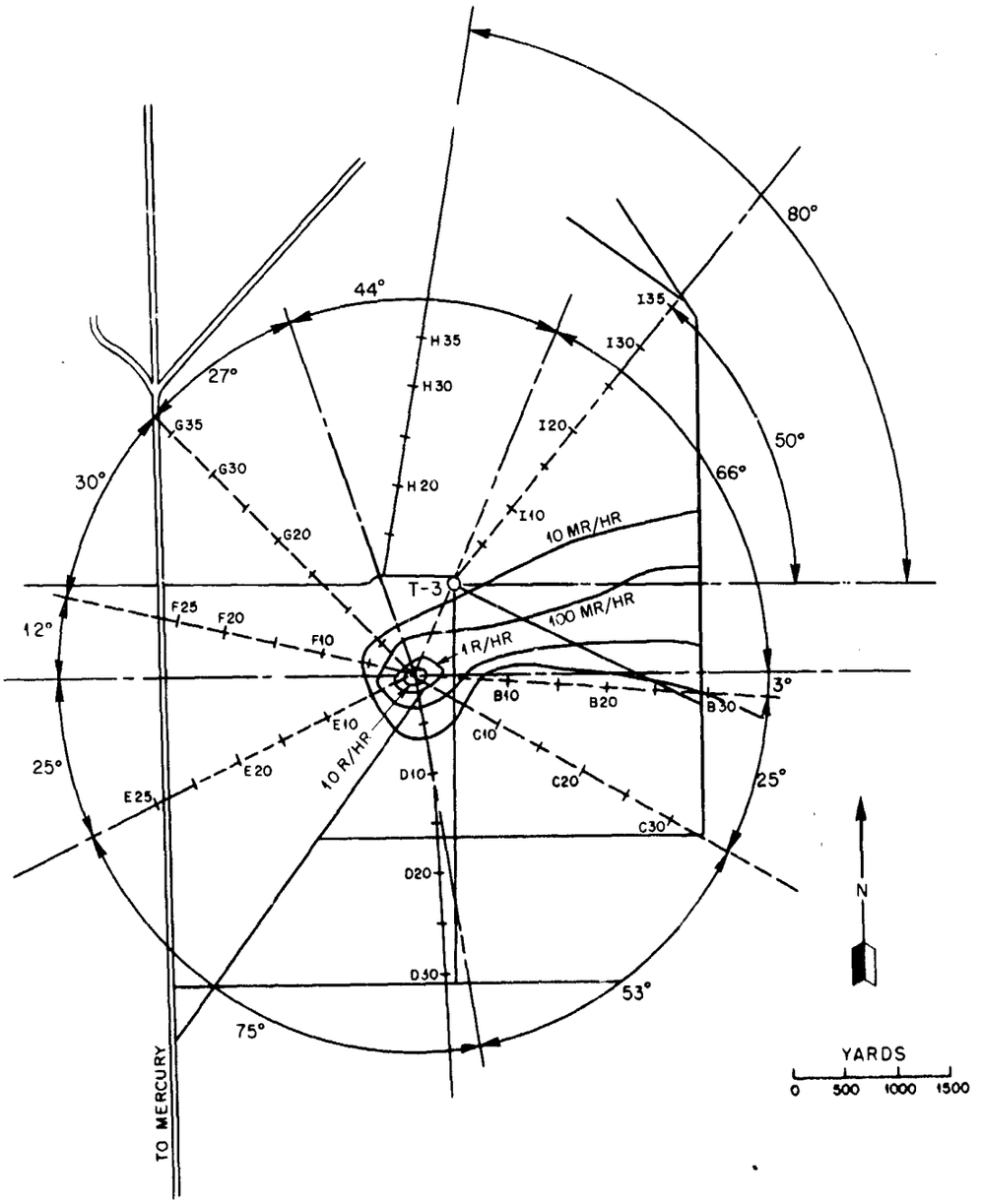


Fig. 3.28—Resurvey 2, Hornet. Area, T-3a; date, 16 March 1955; survey time, 0631 to 0658 hr.

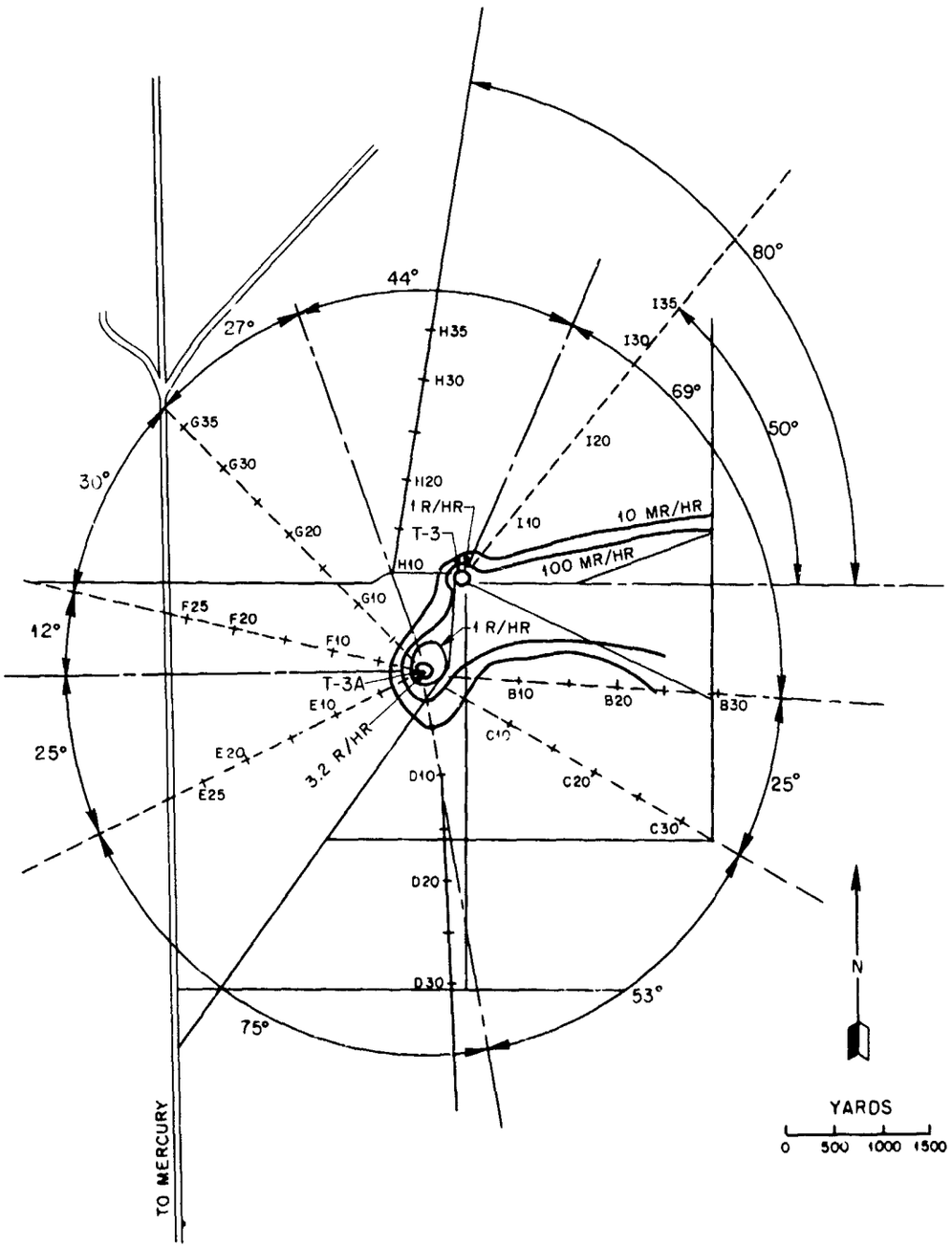


Fig. 3.29—Resurvey 3, Hornet, Area, T-3a; date, 25 March 1955; survey time, 1300 to 1430 hr.

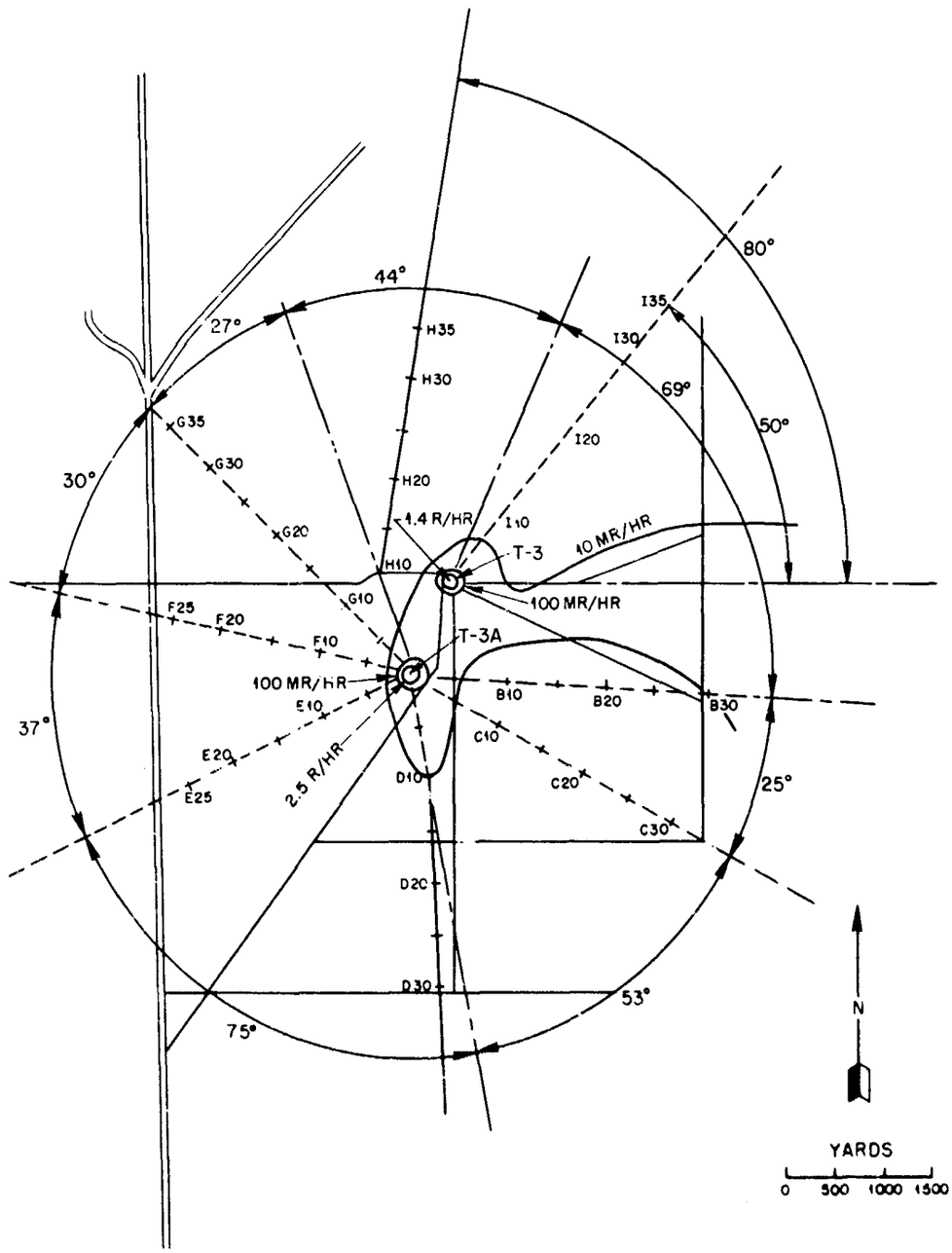


Fig. 3.30—Resurvey 4, Hornet. Area, T-3a; date, 12 April 1955.

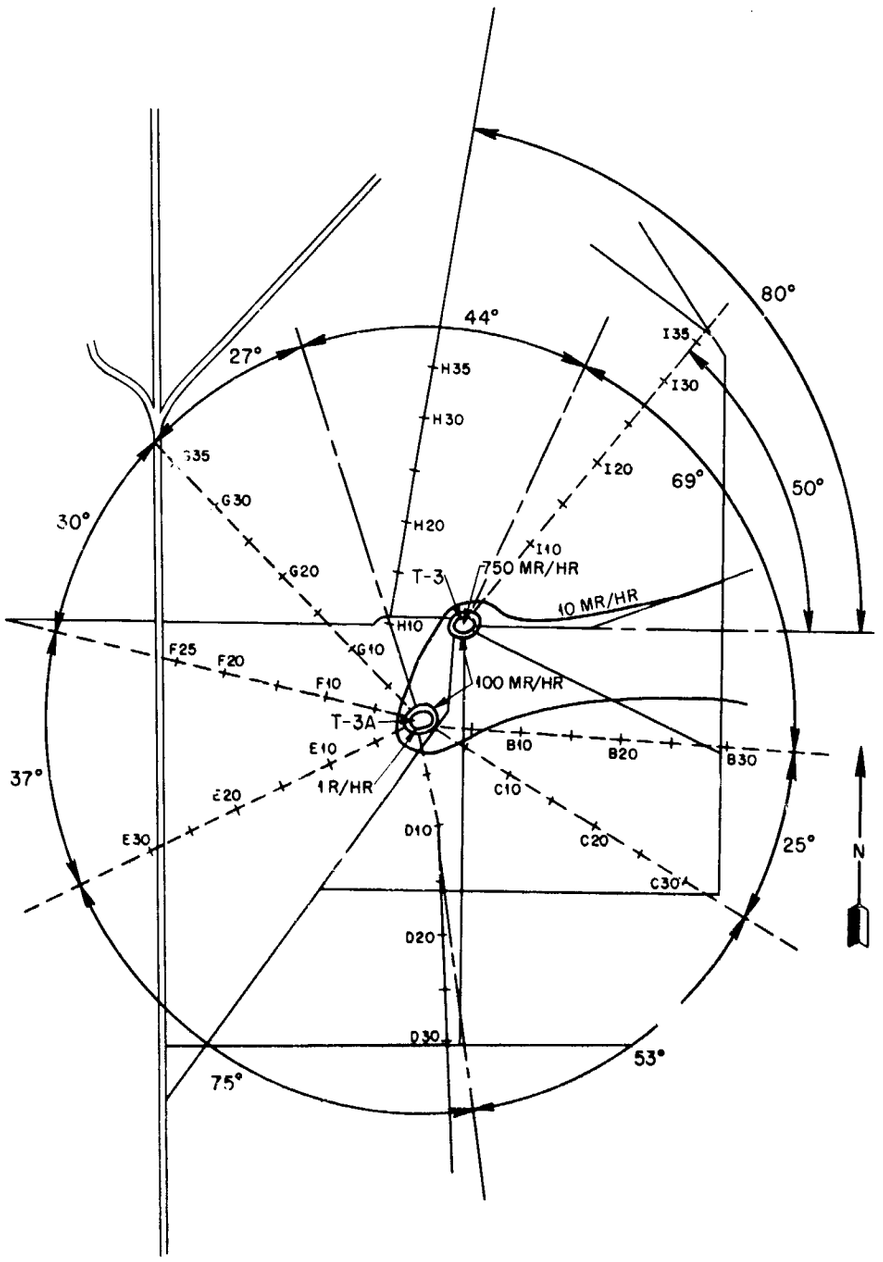


Fig. 3.31—Resurvey 5, Hornet. Area. T-3a; date, 20 April 1955; survey time, 1400 hr.

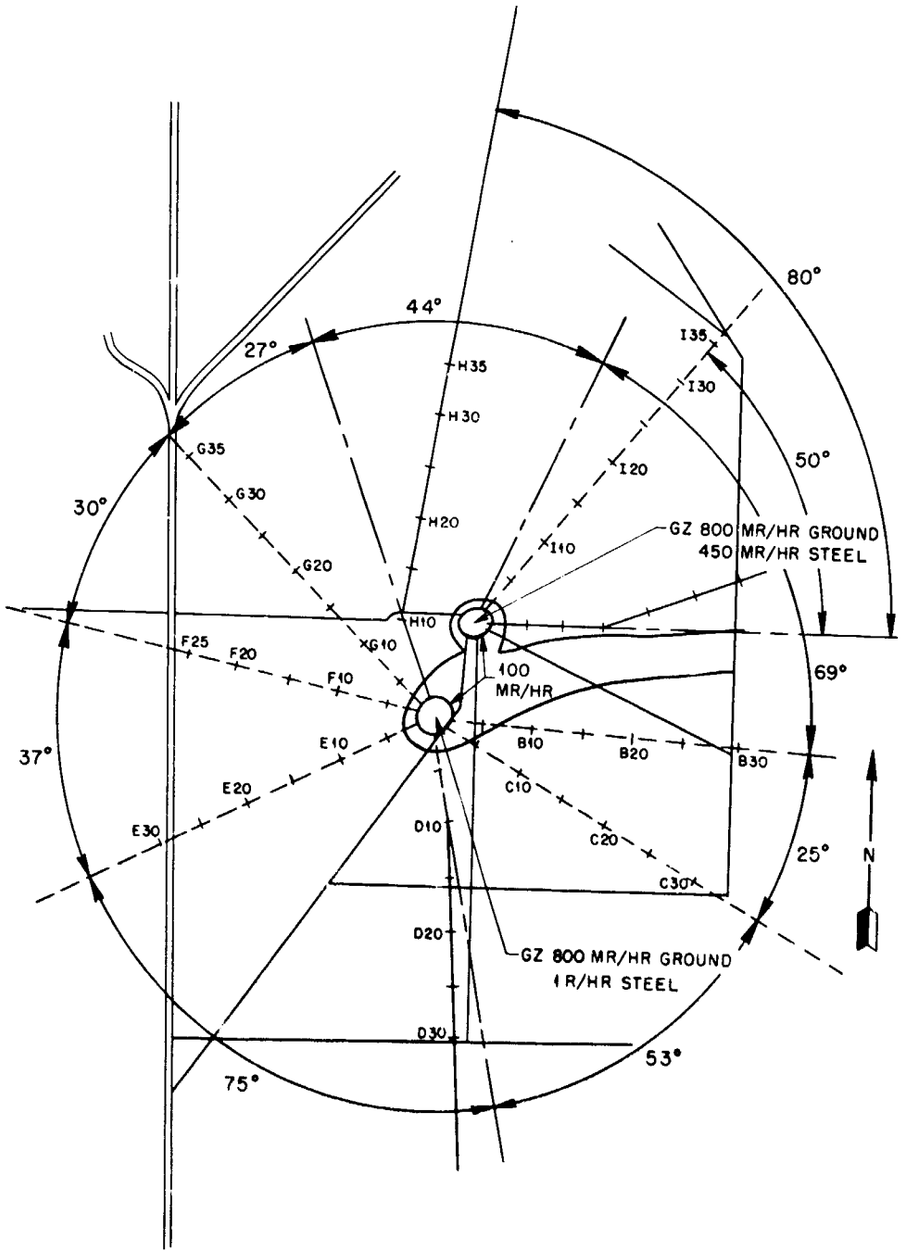


Fig. 3.32—Resurvey 6, Hornet. Area, T-3a; date, 4 May 1955; survey time, 1200 to 1300 hr.

Table 3.16—RESULTS OF SURVEYS, BEE

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey, 22 March 1955			
636.0	0	0540	512.0	100	0552
616.0	10	0548	508.0	1,000	0557
611.0	100	0550	508.0 + 0.15 mile	19,000	0559
608 + 0.1 mile	1,000	0555	423.0	10	0610
608 + 0.3 mile	10,000	0558	411.5	100	0615
717.0	10	0601	408.0	1,000	0620
712	100	0602	407.0 + 0.1 mile	10,000	0623
707.1	1,000	0604	224	1,000	0557
706	10,000	0606	206	10,000	0605
133.0	10	0550	306 + 0.1 mile	10,000	0613
113.5	100	0557	308	1,000	0616
109.0	1,000	0558	313	100	0618
109.0 + 0.25 mile	10,000	0600	318	10	0620
536	0	0544			
		Resurvey 1, 24 March 1955			
133.5	100	1040	503.5	1,000	1031
126.5	10	1042	501.7	10,000	1034
115.0	10	1045	611.0	10	1028
107.5	100	1050	607.5	100	1030
104.2	1,000	1052	605.3	1,000	1033
100.7	10,000	1055	603.0	10,000	1035
223.5	10	1045	712.0	10	1058
207.5	100	1049	707.5	100	1100
204.7	1,000	1052	704.5	1,000	1101
201.2	10,000	1054	702.0	10,000	1103
201.5	10,000	1055	O (3000 ft az. 180° from T-7-1a)	15	1036
307.0	1,000	1100			
311.0	10	1101			
411.0	10	1051	S (14,000 ft az. 57.5° from T-3)	28	1115
407.0	100	1054			
404.3	1,000	1056	AH (9100 ft az. 75° from T-9b)	110	1030
400.5	10,000	1100			
510.5	10	1026	CB (9800 ft az. 49° from T-7-1a)	70	
507.0	100	1029			

Table 3.16— (Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 2, 25 March 1955			
710	10	1345	309	10	1301
706	100	1346	303	100	1303
704.5	1,000	1347	301.5	1,000	1305
701	10,000	1348	301	10,000	1306
819	10	1358	408	10	1320
815.5	100	1400	405.5	100	1321
813.8	1,000	1401	402.8	1,000	1322
801.5	10,000	1402	401	10,000	1323
111	10	1238	510	10	1327
105.5	100	1240	504.5	100	1328
101.8	1,000	1242	501.2	1,000	1329
101	10,000	1245	501	10,000	1330
210.2	10	1253	610	10	1335
204.8	100	1255	607.3	100	1336
202.5	1,000	1257	603.5	1,000	1337
201	10,000	1258	601	10,000	1338
		Resurvey 3, 28 March 1955			
107 + 0.1 mile	10	1115	410 + 0.4 mile	100	1157
107 + 0.2 mile	100	1118	508 + 0.2 mile	10	1205
208 + 0.2 mile	10	1125	508 + 0.3 mile	100	1211
208 + 0.3 mile	100	1129	608 + 0.2 mile	10	1223
307 + 0.2 mile	10	1140	608 + 0.3 mile	100	1230
307 + 0.3 mile	100	1144	707 + 0.1 mile	10	1248
410 + 0.3 mile	10	1152	707 + 0.3 mile	100	1300

Table 3.17—HELICOPTER DATA, BEE

Location	Intensity (T1B), mr/hr	Probe intensity, mr/hr	Altitude above terrain, ft	Time	Computed ground reading,* mr/hr
Initial Survey, 22 March 1955					
Z (12,200 ft az. 190° from T-9b)	2	0	500	0532	18
CB (9800 ft az. 49° from T-7-1a)	11	20	400	0543	88
AF (7500 ft az. 179° from T-9b)	3	5	500	0546	36
CV (10,300 ft az. 88° from T-7-4)	80	300	460	0553	832
S (14,000 ft az. 57.5° from T-3)	60	350	500	0556	720
O (3000 ft az. 180° from T-7-1a)	300	375	340	0615	1740
EN (13,900 ft az. 70° from T-3a)	14	0	20	0626	17
A (Y junction)	0		20	0732	
CW (950 ft az. 270° from T-7-4)	0		20	0737	
CB (9800 ft az. 49° from T-7-1a)	2200		20	0740	440
DA (22,050 ft az. 138° from T-10a)	8		50	0741	12
DB (13,800 ft az. 109° from T-10a)	0		50	0745	
DC (16,650 ft az. 98°30′ from T-10a)	0		50	0746	
DL (19,400 ft az. 78° from T-10a)	0		50	0749	
DO (28,600 ft az. 67° from T-10a)	0		50	0753	
Gate 5 (6150 ft az. 45° from T-10a)	1.3		10	0755	1.43
CM (5700 ft az. 52° from T-10a)	0.8		20	0756	0.96
CO (3950 ft az. 33° from T-10a)	1.0		20	0757	1.2
BB (GZ, T-10a)	0.5		20	0751	0.6
CF (7050 ft az. 125° from T-10a)	0.5		10	0800	0.55
AW (10,200 ft az. 50° from T-9b)	10		50	0801	15
DN (30,600 ft az. 71° from T-9c)	0.4		200	0806	1.3
DP (24,900 ft az. 53° from T-10a)	0		50	0816	
GZ (T-7-1a)	0.6		50	0819	0.9
AA (3700 ft az. 163° from T-9b)	440		50	0824	660

*Computed ground reading taken from "Correlation Curves for Air to Ground Readings," 3 April 1953, Operation Upshot-Knothole Rad-Safe Report WT-817, Chap. 14.

Table 3.18—MISCELLANEOUS READINGS, BEE

Location	Intensity, mr/hr	Time
Initial Survey, 22 March 1955		
AH (9100 ft az. 75° from T-9b)	26	0543
BI (12,500 ft az. 315.5° from T-3a)	0	0543
BH (13,700 ft az. 35° from T-3a)	2	0625
CB (9800 ft az. 49° from T-7-1a)	16	0551
CB + 0.5 mile S	16	0552
CB + 1.0 mile S	210	0554
CB	12	0607
CB + 1.0 mile S	100	0620
CB + 1.8 miles S	280	0628
CB + 2.1 miles S	100	0629
CB + 2.4 miles S	10	0631
Stake 224	390	0625
O (3000 ft az. 180° from T-7-1a)	450	0602

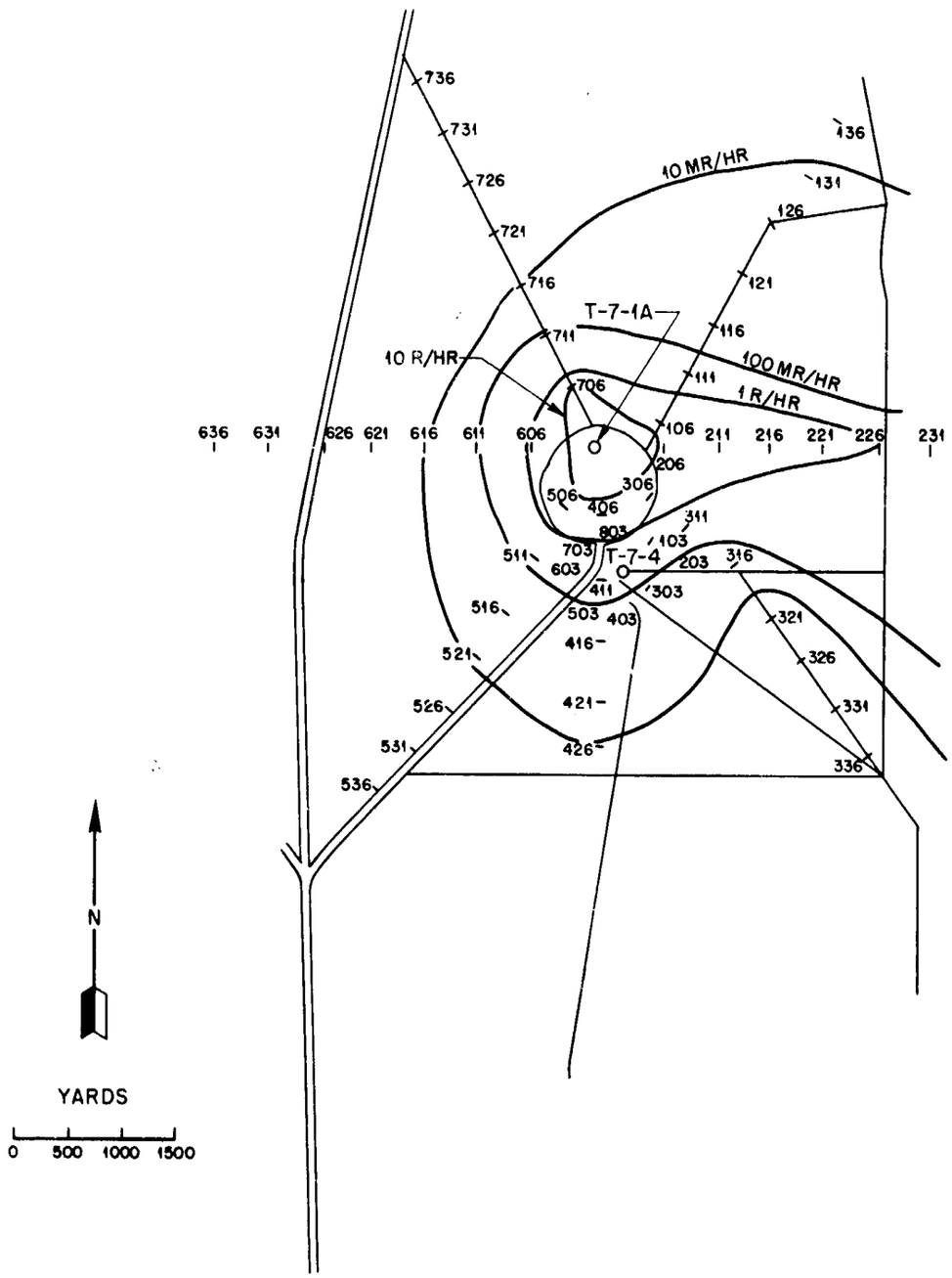


Fig. 3.33—Initial survey, Bee. Area, T-7-1a; date, 22 March 1955; survey time, 0540 to 0640 hr.

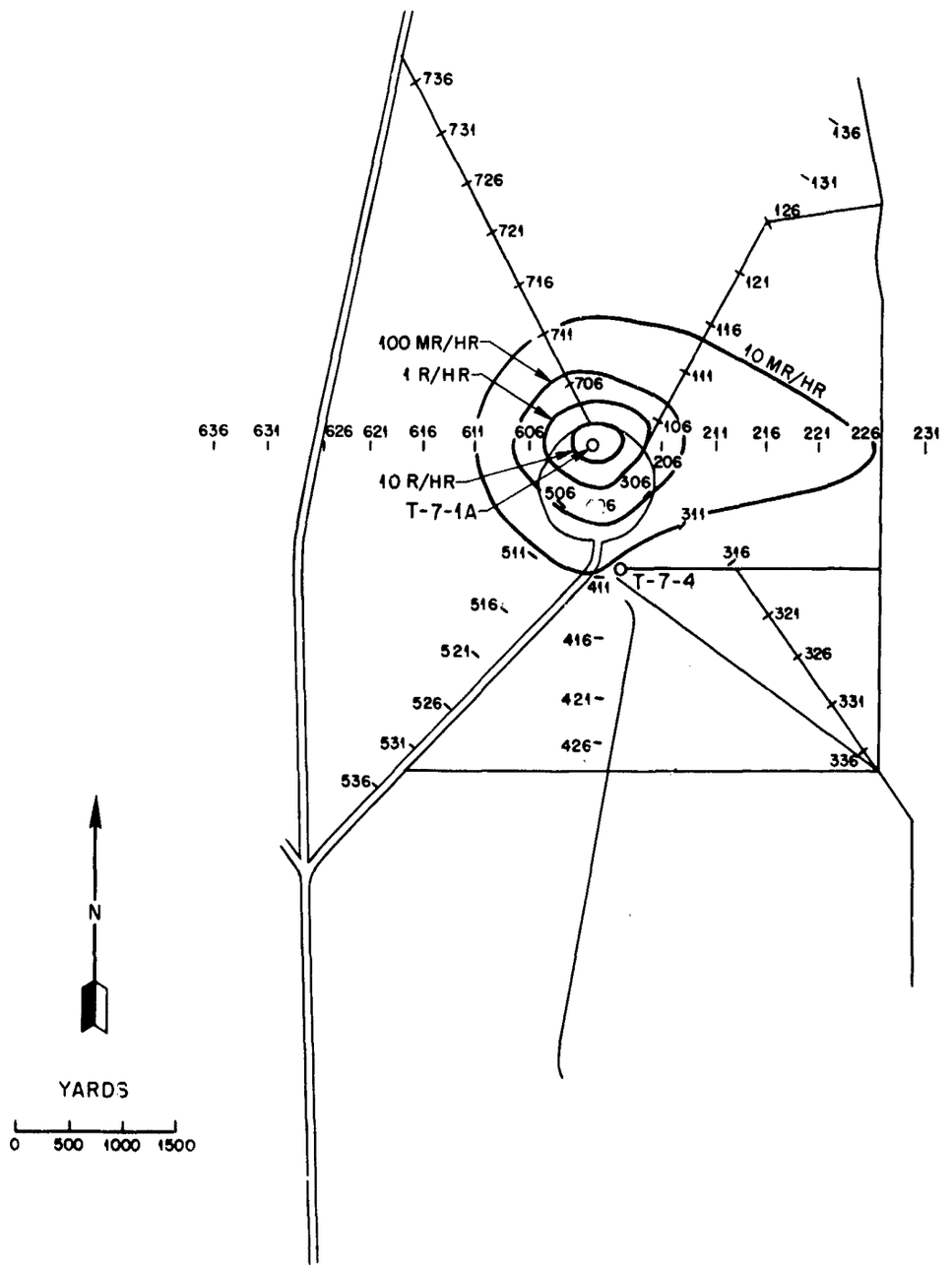


Fig. 3.34—Resurvey 1, Bee. Area, T-7-1a; date, 24 March 1955; survey time, 1026 to 1115 hr.

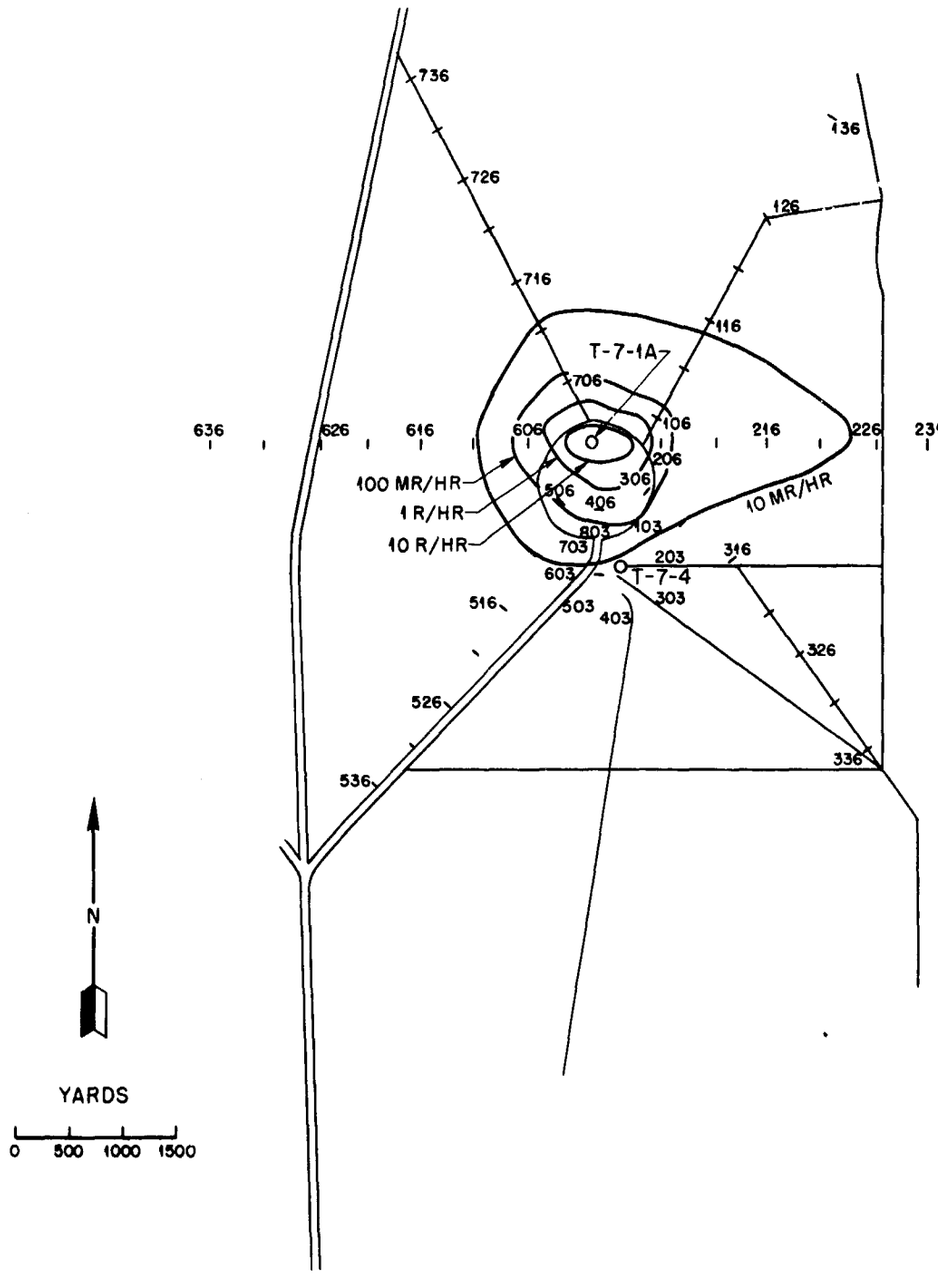


Fig. 3.35—Resurvey 2, Bee. Area, T-7-1a; date, 25 March 1955; survey time, 1026 to 1115 hr.

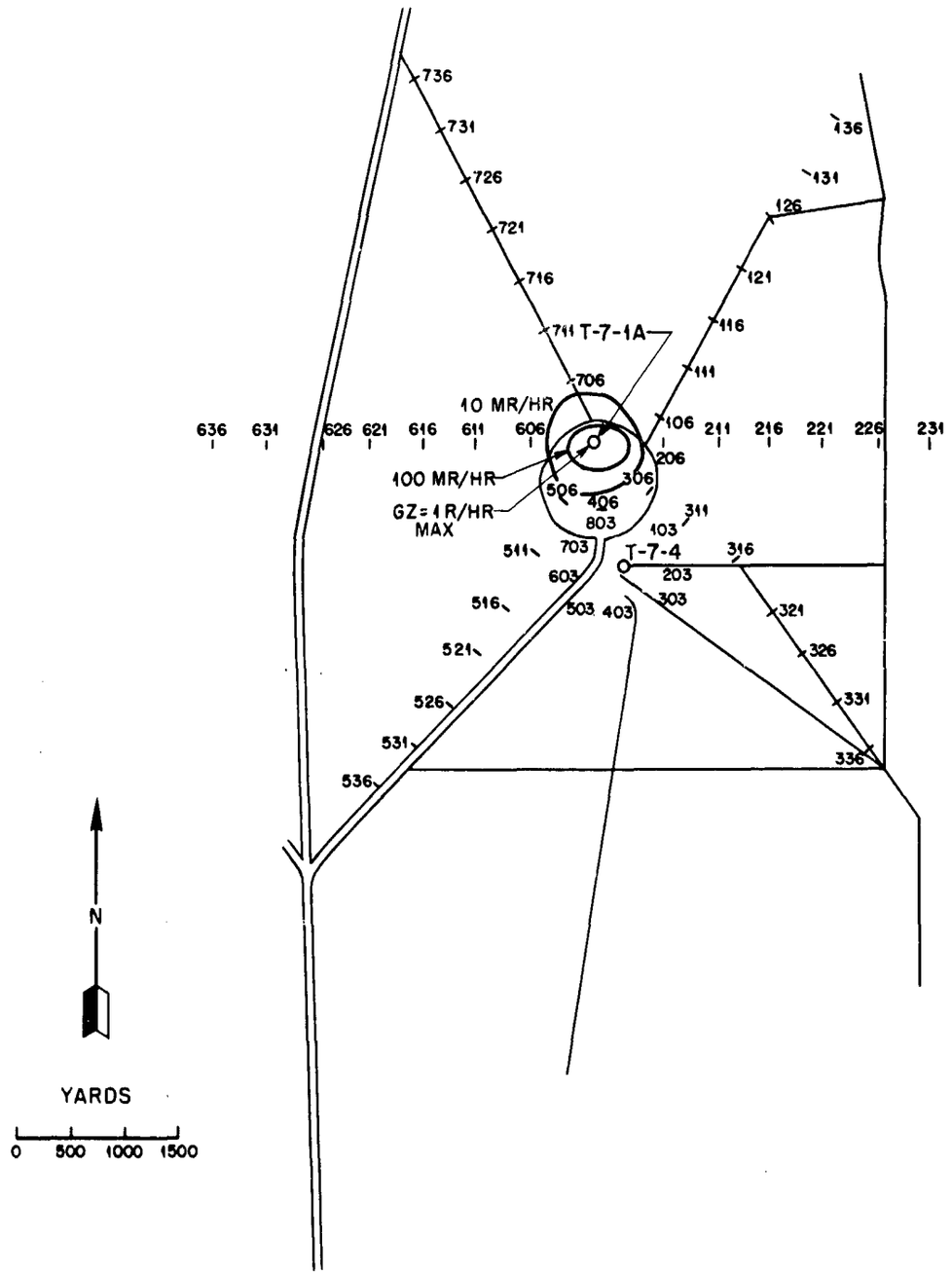
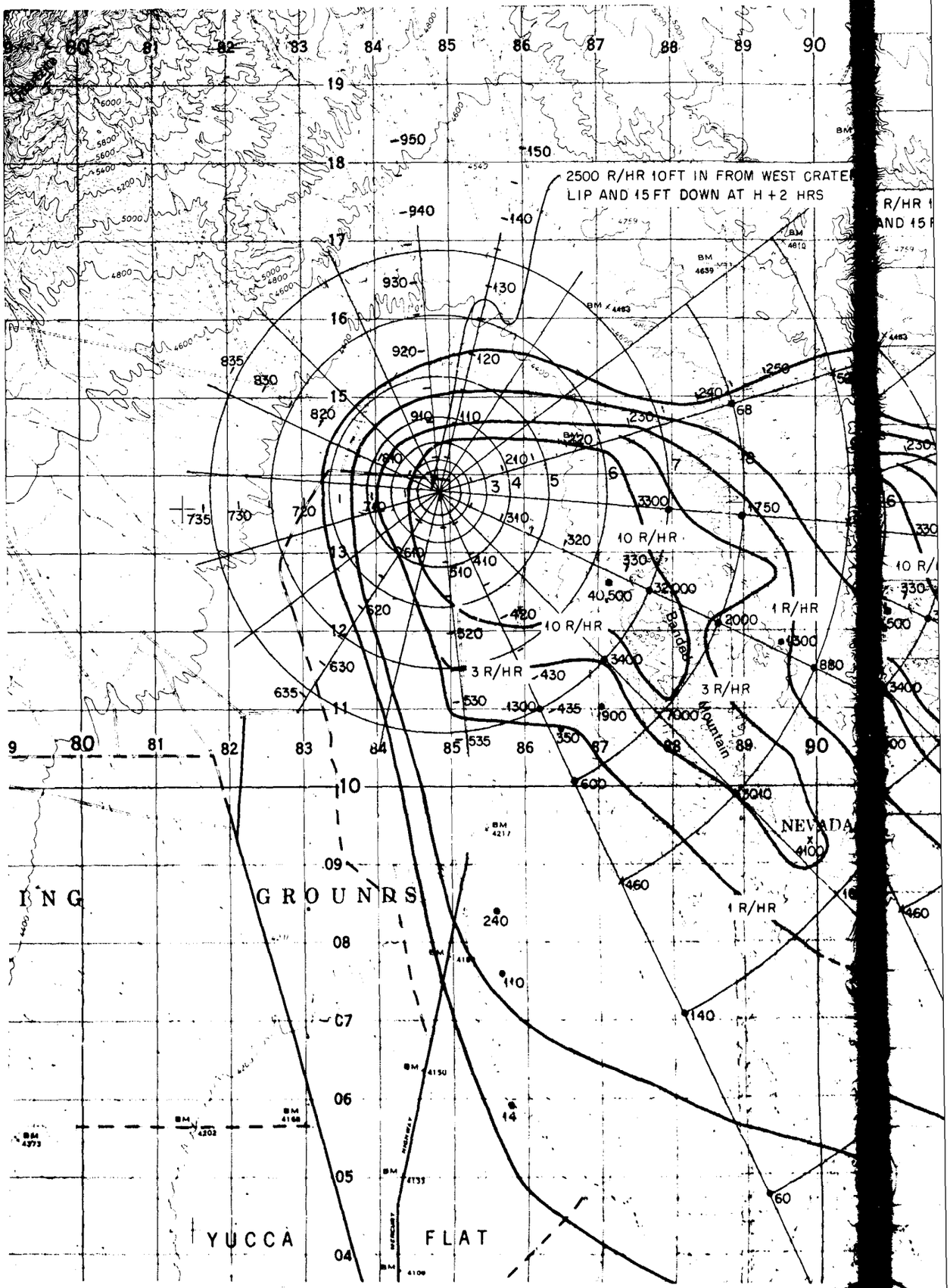
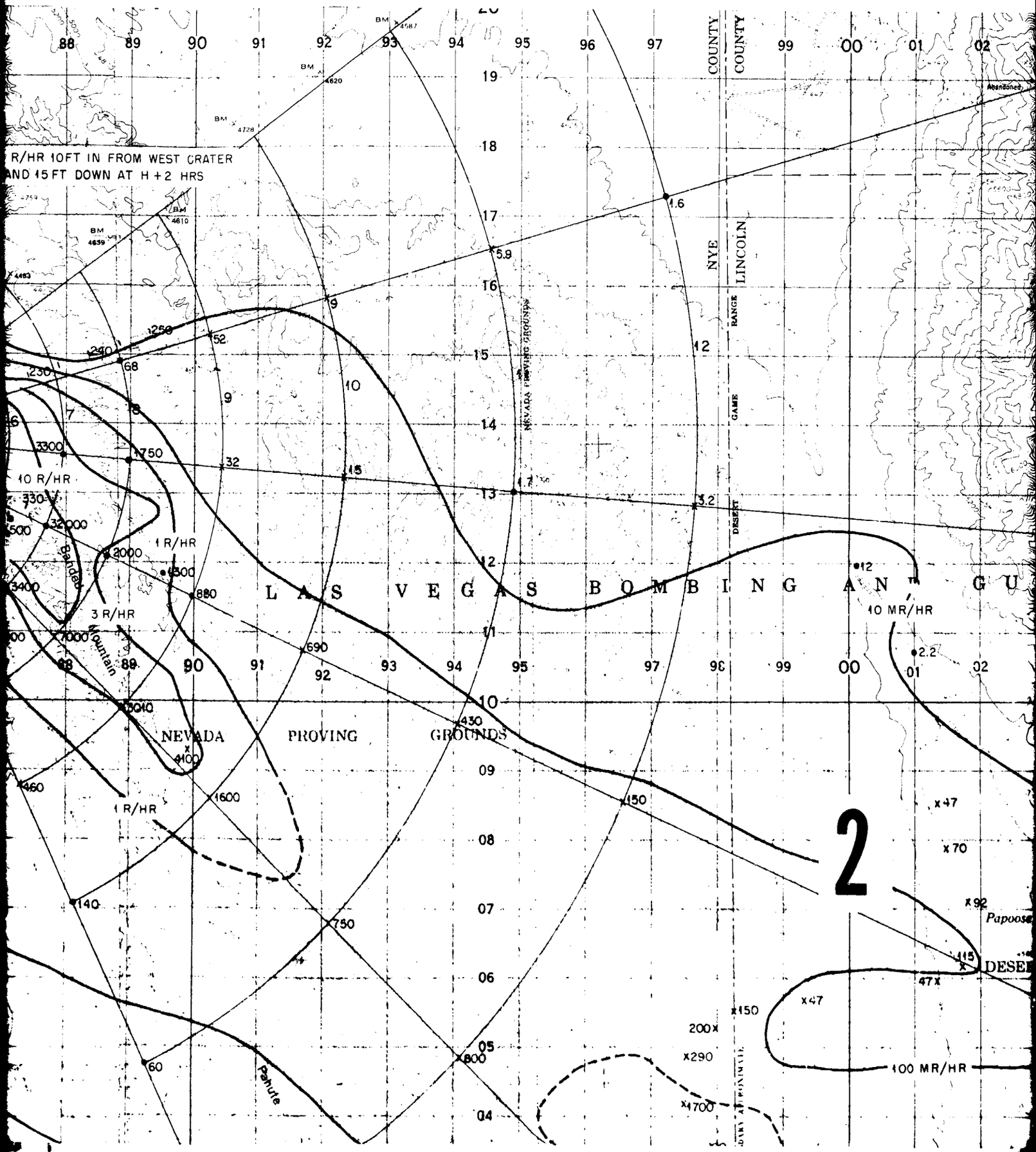
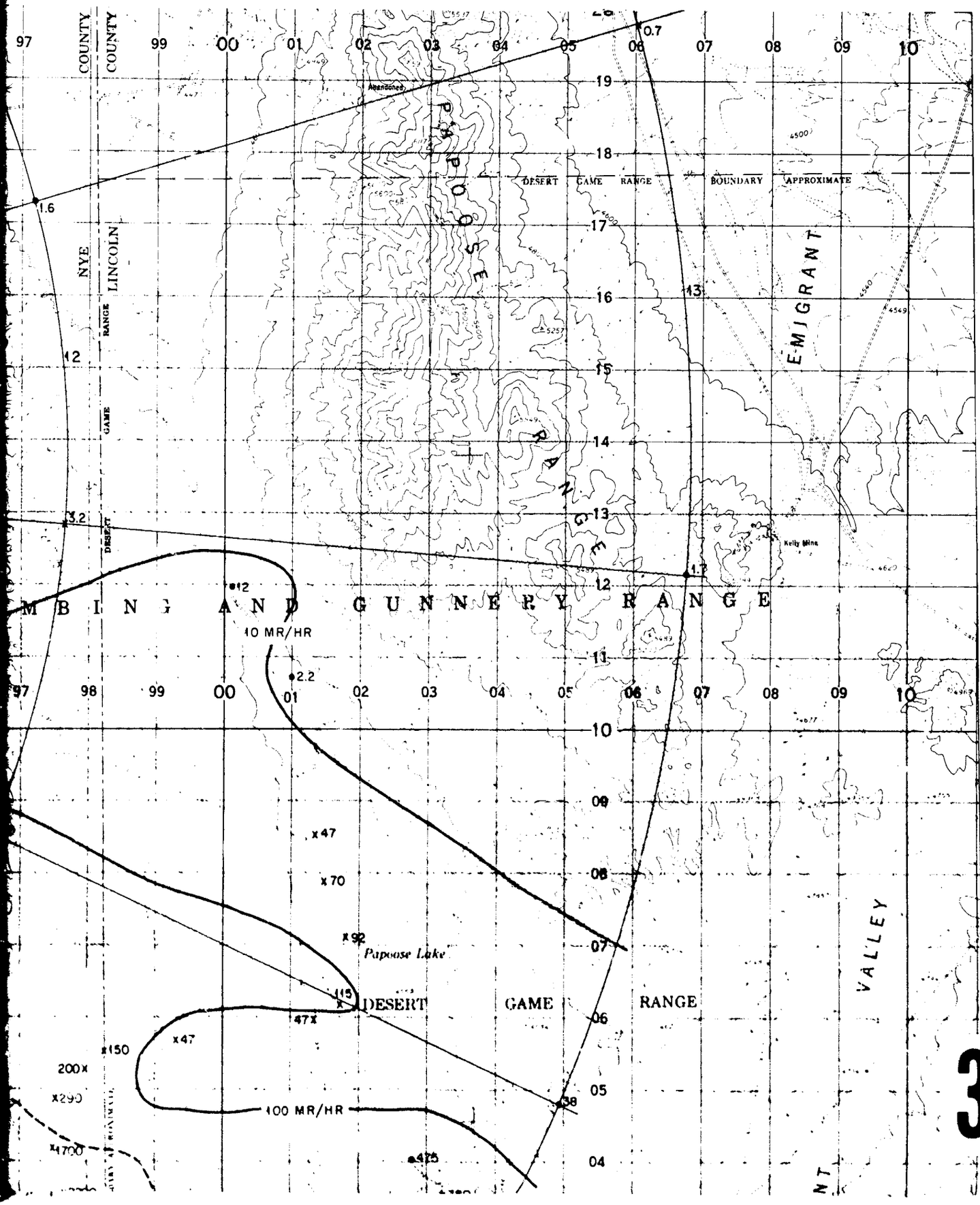


Fig. 3.36—Resurvey 3, Bee. Area, T-7-1a; date, 28 March 1955; survey time, 1115 to 1300 hr.

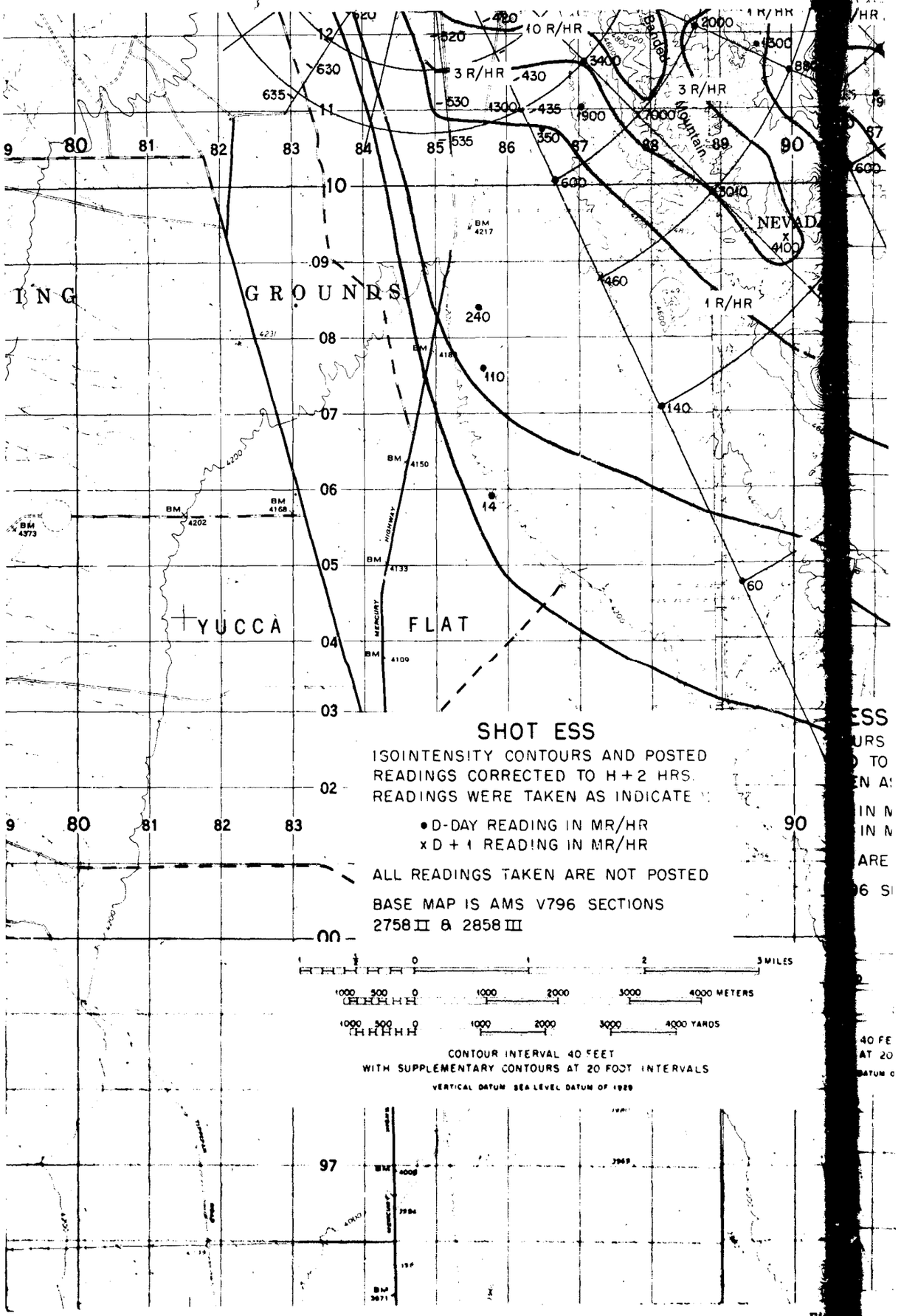

2500 R/HR 10FT IN FROM WEST CRATER LIP AND 15 FT DOWN AT H + 2 HRS
10 R/HR
1 R/HR
3 R/HR
10 R/HR
3 R/HR
1 R/HR
Bandaberry Mountain
NEVADA
YUCCA FLAT
GROUNDS

1


R/HR 10FT IN FROM WEST CRATER
AND 15 FT DOWN AT H + 2 HRS
L A S V E G A S B O M B I N G A N G U
NEVADA PROVING GROUNDS
10 R/HR
1 R/HR
3 R/HR
1 R/HR
10 MR/HR
100 MR/HR
COUNTY
NYE
LINCOLN
RANGE
GAME
DESERT
Abandoned
Mountain
Paiute
Papoose
2


97
COUNTY
COUNTY
99
00
01
02
03
04
05
06
07
08
09
10
19
18
17
16
15
14
13
12
11
10
09
08
07
06
05
04
Abandoned
PAPOOSE
RANGE
DESERT GAME RANGE BOUNDARY APPROXIMATE
EMIGRANT
VALLEY
NYE
LINCOLN
RANGE
GAME
DESERT
1.6
0.7
1.7
3.2
Kelly Mine
4500
4600
4569
5257
MBING AND GUNNERY RANGE
10 MR/HR
100 MR/HR
2.2
x47
x70
x92
Papoose Lake
DESERT GAME RANGE
47x
x47
x150
200x
x290
x1700
38
415

3


10 R/HR
3 R/HR
3 R/HR
1 R/HR
NEVADA
GROUNDS
YUCCA FLAT
Mountain
HIGHWAY
MERCURY
BM 4217
BM 4150
BM 4202
BM 4168
BM 4373
BM 4133
BM 4109
240
110
140
14
60
460
SHOT ESS
ISOINTENSITY CONTOURS AND POSTED READINGS CORRECTED TO H+2 HRS.
READINGS WERE TAKEN AS INDICATED
• D-DAY READING IN MR/HR
x D + 1 READING IN MR/HR
ALL READINGS TAKEN ARE NOT POSTED
BASE MAP IS AMS V796 SECTIONS 2758 II & 2858 III
1 0 1 2 3 MILES
1000 500 0 1000 2000 3000 4000 METERS
1000 500 0 1000 2000 3000 4000 YARDS
CONTOUR INTERVAL 40 FEET
WITH SUPPLEMENTARY CONTOURS AT 20 FOOT INTERVALS
VERTICAL DATUM SEA LEVEL DATUM OF 1929

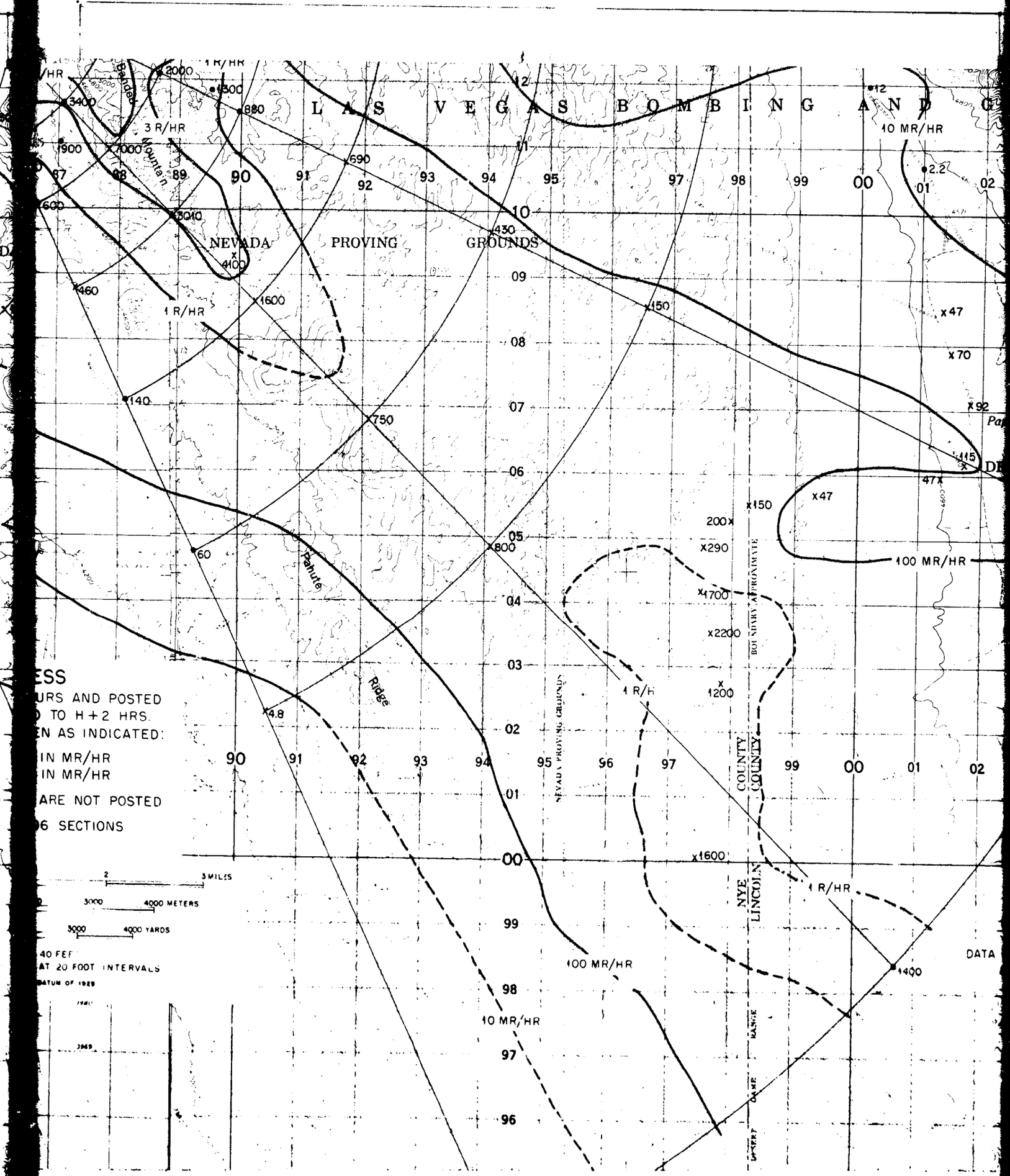
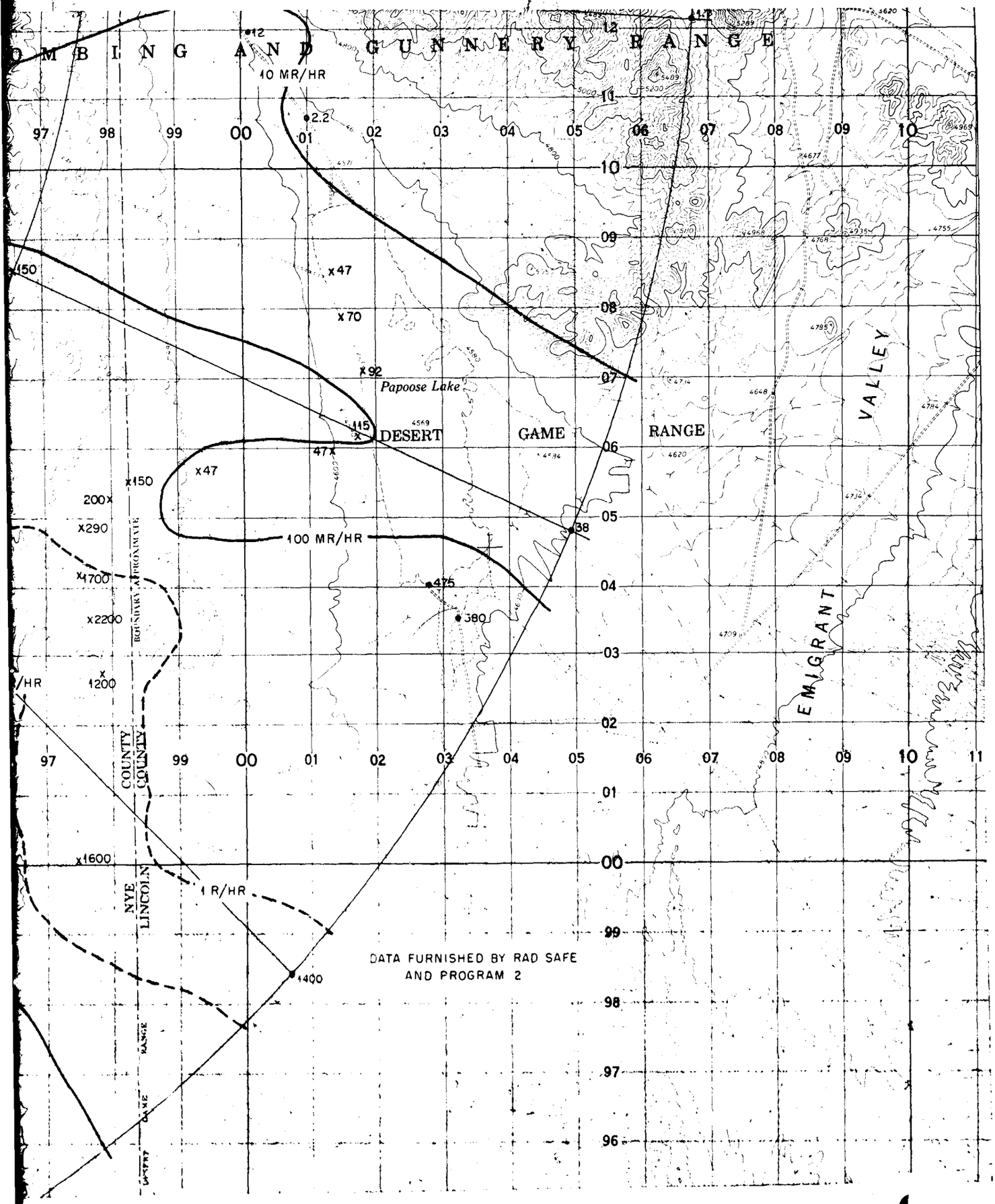


Fig. 3.37 — Isointensity contours and posted readings corrected to H + 2 hr, Ess. O, D-day reading in milliroentgens per hour. x, D + 1 reading in milliroentgens per hour. All readings taken are not posted.

5



+2 hr, Ess. O, D-day reading in
. All readings taken are not posted.

6

was 1000 r/hr at 1428 hr. A second run was initiated from the same point. The probe was lowered to approximately 25 ft above the terrain. At 1¼ miles out the reading was 250 r/hr. The increase was much more rapid on the second run. On the brink of the west end of the crater, 2000 r/hr was read at 1437 hr. The probe was then dropped 15 ft into the crater and 10 ft toward the center. The reading at this location at 1439 hr was 2500 r/hr.

R-hour was declared by the Test Director at 1450 hr.

Resurveys of the Ess area were conducted on 24, 26, and 30 March and on 6 April 1955.

Project participation for Ess was heavy. In March, 13 parties were processed into the area on shot day; 17 parties on the 24th; 14 parties on the 25th; 9 parties on the 26th; 2 parties on the 27th; 7 parties on the 28th; 2 parties on the 29th; 7 parties on the 30th; and 8 parties on the 31st. In April, 1 party was processed on the 1st; 4 parties on the 2nd; 3 parties on the 4th; 2 parties on the 5th; 1 party on the 6th; and 2 parties on the 7th.

Survey data for this shot are shown in Tables 3.19 to 3.25. Isointensity plots are shown in Figs. 3.37 to 3.45. Figure 3.37 is a composite isointensity-line plot for H+2 hr on AMS map V796, Sections 2758 II and 2858 III. This plot is based wholly on D-day and D+1 day data that were obtained by the Rad-Safe Organization, Program 2, and Project 37.2. The southwest portion of the 100 and the 10 mr/hr isointensity lines is extended considerably by the presence of the contamination remaining in Area 9 from shot Tesla. A correction for this was not attempted since the last survey recorded in this area was made a week before Ess. Data from this last Tesla survey in Area 9 are shown in Table 3.7.

3.9 SHOT APPLE

At 0455 hr, 29 March 1955, shot Apple was detonated on a 500-ft tower in Area 4 of Yucca Flat. Briefing of the survey teams was accomplished 30 min prior to shot time. Since Wasp' was to be fired later in the day, it was originally planned to conduct a limited survey; however, it was possible to complete the survey and announce a recovery period prior to the firing of Wasp'. The survey team was released from the assembly point at 0520 hr. The first reading was taken at 0527, and the survey was completed at 0640 hr.

A helicopter survey was conducted of various outlying EG&G phototrailer installations to determine the possibility of recovery. A few of the more important stations were also checked on a "need-to-know" basis. The helicopter readings were completed at 0610 hr.

A limited recovery hour was announced, and parties of Projects 6.1.2, 2.2, 1.6, 18, 13.3, 3.1, EG&G, and Reynolds Electric and Engineering Co. were permitted entry to the area, with the agreement that they would clear the area by 0800 hr, so that preparation for Wasp' could be made. Normal recovery operations were resumed at 1118 hr, upon declaration of R-hour following the initial survey of Wasp' in Area 7-4.

Twenty-five parties of participating projects were briefed and cleared for entry to Area 4 through the Plotting and Briefing Section on shot day. During the survey, one spot reading of 10 r/hr reached Mercury highway at the point of the northern "Y" junction located ½ mile south of the main access road to Area T-2. The 10 r/hr line crossed Mercury highway at reference point AF and continued beyond Area T-9c. The tower in Area 9c was contaminated to a level of 25 mr/hr, necessitating use of film badges for workmen in that area. Resurveys were conducted on 30 March and 1 and 2 April 1955.

Survey data are shown in Tables 3.26 to 3.28. Isointensity plots are shown in Figs. 3.46 to 3.51.

3.10 SHOT WASP'

At 1000 hr, 29 March 1955, shot Wasp' was detonated at a height of approximately 800 ft in Area 7-4. At H+2 min the survey parties were dispatched from the Rad-Safe Building. The ground survey began at 1033 and was completed at 1110 hr.

(Text continues on page 119.)

Table 3.19—RESULTS OF SURVEYS, ESS

Stake line location	Intensity, mr/hr	Time	Intensity at H+2 hr, mr/hr	Stake line location	Intensity, mr/hr	Time	Intensity at H+2 hr, mr/hr
Initial Survey, 23 March 1955							
122	10	1351	6.2	912	180	1400	130
121	15	1352	9	911	360	1402	250
120	22	1353	13	910	700	1406	520
119	45	1354	30	909	1,400	1408	1,100
118	100	1354	67	908	2,400	1412	2,000
117	120	1355	80	907	8,000	1416	6,800
116	150	1356	100	906	10,000	1420	8,700
115	250	1357	170	719	10	1329	4.3
114	450	1358	320	718	15	1330	6.5
113	1,000	1359	700	717	25	1331	11
112	2,000	1359	1,400	716	40	1332	17
111	10,000	1400	7,100	715	50	1333	22
236	10	1455	12	714	120	1334	55
235	15	1455	18	713	190	1336	89
234	25	1456	31	712	330	1337	160
233	45	1457	58	711	600	1338	315
232	100	1457	125	710	1,200	1339	650
231	200	1458	255	709	2,100	1340	1,200
230	1,000	1458	1,300	708	4,200	1341	2,400
229	3,500	1459	5,100	707	10,000	1342	5,500
228	6,000	1459	7,700	623	10	1330	4.3
227	7,000	1500	9,000	622	12	1332	5.3
226	8,000	1500	10,500	621	20	1334	9.4
225	9,000	1501	11,500	620	28	1336	13
224	10,000	1502	13,000	619	44	1338	22
514	10,000	1444	11,500	618	80	1340	41
820	10	1322	3.3	617	120	1341	62
819	11	1324	3.6	616	200	1342	110
818	15	1325	5.8	615	320	1344	190
817	24	1327	10	614	600	1345	340
816	36	1328	17	613	1,000	1346	585
815	60	1329	26	612	1,900	1348	1,100
814	85	1331	34	611	10,000	1350	6,000
813	110	1332	50	436	1,000	1350	610
812	270	1333	120	435	1,200	1351	740
811	470	1335	205	434	1,300	1351	800
810	900	1336	360	433	2,000	1352	1,300
809	2,000	1337	960	432	2,200	1353	1,500
808	3,600	1338	2,200	431	2,400	1353	1,550
807	10,000	1340	5,200	430	3,200	1354	2,300
918	10	1346	5.8	429	4,400	1354	2,800
917	15	1347	8.7	428	5,000	1355	3,200
916	22	1348	13	427	5,300	1355	3,600
915	36	1350	21	426	5,500	1356	3,800
914	60	1355	40	425	700	1356	470
913	100	1358	70	424	10,000	1357	6,900

Table 3.19—(Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 1, 24 March 1955			
119	10	0707	611	400	0703
118	20	0707	610	3,020	0704
117	22	0708	609	4,000	0704
116	23	0708	608	6,000	0705
115	25	0709	607	7,000	0706
114	30	0710	606	7,500	0707
113	60	0710	605	8,000	0708
112	100	0711	604	10,000	0708
111	2,000	0711	712	10	0709
110	4,000	0712	711	16	0710
109	4,500	0712	710	29	0712
108	4,500	0713	709	100	0714
107	5,000	0714	708	190	0715
106	6,000	0714	707	390	0717
105	10,000	0715	706	3,900	0719
231.5	10	0808	705	10,000	0720
229.5	100	0810	818	12	0700
222	1,000	0812	812	12	0702
207	10,000	0814	811	18	0704
9c tower	16	0656	810	34	0706
436	50	0706	809	80	0708
435	45	0706	807	300	0710
434	45	0707	806	4,000	0712
433	45	0707	805	6,000	0714
432	50	0708	804	10,000	0715
429	100	0710	915	10	0730
418	1,000	0713	914	40	0731
409	10,000	0715	913	50	0732
815	100	0700	912	35	0733
535	38	0710	911	60	0734
532	100	0713	910	80	0735
513	1,000	0716	909	220	0736
505	10,000	0720	908	1,000	0737
614	10	0700	907	8,000	0738
613	30	0701	904	10,000	0740
612	60	0702	315	10,000	0734
		Resurvey 2, 26 March 1955			
910.7	10	0652	205.2	10,000	0753
908	100	0653	9c tower	6	0753
907.8	1,000	0653	709	10	0655
901.5	10,000	0655	707	100	0656
114	10	0708	705	1,000	0659
112.5	100	0709	702	10,000	0703
110.8	1,000	0710	808.5	10	0718
102.4	10,000	0711	807	100	0720
535	10	0645	806.5	1,000	0721
517	100	0652	801.2	10,000	0723
507	1,000	0655	613	10	0735
502.5	10,000	0658	611	100	0738
230.5	10	0742	331	600	0711
228	100	0744	330	400	0713
209.5	1,000	0750	318	1,000	0716

Table 3.19—(Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 2, 26 March 1955			
307	10,000	0721	423	100	0738
406	10,000	0731	431	20	0741
413	1,000	0734	434	30	0742
			436	66	0744
		Resurvey 3, 30 March 1955			
911	10	1225	603.6	1,000	1130
908.1	100	1227	601	10,000	1135
904	1,000	1230	704	1,000	1136
902	10,000	1234	706.5	100	1137
502.1	10,000	1241	712	10	1142
313.5	1,000	1245	810	10	1152
331	190	1255	806.7	100	1155
232	10	1305	804.3	1,000	1159
219.1	100	1309	802.5	10,000	1200
204	1,000	1315	101.1	10,000	1206
201	10,000	1321	105	1,000	1210
421	100	1018	111.2	100	1213
410.5	1,000	1030	115.6	10	1216
404	10,000	1037	9c tower	4.8	0927
502	10,000	1043	Bunker 9-300	10	0921
505.5	1,000	1047	Road junction N of bunker 9-300	10	0939
513.7	100	1053			
537.8	38	1109	Road junction N of above road junction	100	0947
636	37	1117			
629	24	1120	1 mile S of DD*	10	1355
611	100	1127	5.1 miles S of DD	10	1425
		Resurvey 4, 6 April 1955			
316	100	1350	910	10	1415
307	1,000	1352	909	100	1415
Crater lip	4,500	1354	703	1,000	1420
407	1,000	1357	704	100	1420
413	100	1359	707	10	1421
421	10	1400	601	1,000	1426
221	10	1402	605	100	1427
112	10	1406	611	10	1429
107	100	1407	505	1,000	1535
103	1,000	1409	506	100	1536
			512	10	1537
		Resurvey 5, 12 April 1955			
909	10	0947	408	1,000	0907
905.5	100	0945	411	100	0904
902.4	1,000	0942	421	10	0900
Crater rim	3,000	0940	610.5	10	0852
202.1	1,000	0932	604	100	0839
204	100	0930	704	100	0845
221	10	0927	702.2	1,000	0840
328	10	0920	704	100	0838
314	100	0915	705	10	0834
302.2	1,000	0908			

Table 3.19 — (Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 6, 21 April 1955			
419.5	10	1144	217	10	1158
410.9	100	1145	203	100	1159
401.5	1,000	1146	111	10	1203
303	800	1150	105	105	1204
313	100	1151	909	10	1208
315	100	1152	905	100	1209
328	10	1153	703	100	1214
Crater rim	2,600	1220	706	10	1215
		Resurvey 7, 4 May 1955			
322	10	1045	105	100	1050
311	100	1046	111	10	1050
Crater rim	550	1047	206	100	1051
303.2	100	1048	213.5	10	1052
805.8	10	1048	510	10	1053
609.5	10	1049	501.5	100	1054
601	100	1049			

* DD, 14,100 ft az. 79° from T-10a.

Table 3.20 — MISCELLANEOUS READINGS, ESS

Location	Intensity, mr/hr	Time	Intensity, H + 2 hr, mr/hr
	Initial Survey, 23 March 1955		
1.3 miles E of AA (3700 ft az. 163° from T-9b)	100	1310	27
Stake 727 of Area 7-1a	260	1339	145
AV (8500 ft az. 50° from T-9b)	1,000	1321	350
AW (10,200 ft az. 50° from T-9b)	5,000	1323	1,900
0.1 mile E of AW	10,000	1324	3,950
Stake 718 of Area 7-1a	160	1341	82
9c tower	200	1450	240
Stake 717 of Area 7-1a	25	1342	14
Stake 716 of Area 7-1a	40	1343	22
Stake 715 of Area 7-1a	50	1344	29
Stake 714 of Area 7-1a	120	1345	68
0.7 mile S of T-9c	10	1433	10
0.58 mile S of T-9c	100	1435	110
0.35 mile S of T-9c	1,000	1436	1,100
	Resurvey 1, 24 March 1955		
AZ (5450 ft az. 131° from T-9b)	7	0651	
AY (7000 ft az. 91° from T-9b)	10	0657	
AH (9100 ft az. 75° from T-9b)	35	0703	
AW (10,200 ft az. 50° from T-9b)	240	0709	
AV (8500 ft az. 50° from T-9b)	100	0707	
AU (7000 ft az. 50° from T-9b)	140	0702	
CB (9800 ft az. 49° from T-7-1a)	10	0710	

Table 3.20 — (Continued)

Location	Intensity, mr/hr	Time	Intensity, H+2 hr, mr/hr
Resurvey 2, 26 March 1955			
AZ (5450 ft az. 131° from T-9b)	2	0650	
AY (7000 ft az. 91° from T-9b)	3	0652	
AH (9100 ft az. 75° from T-9b)	20	0656	
AV (8500 ft az. 50° from T-9b)	80	0658	
AW (10,200 ft az. 50° from T-9b)	80	0659	
9 April 1955			
Crater lip*	2,000	1400	
Crater bottom to crater top*	150–1,000	1400	

*All readings taken 3 ft above ground surface.

Table 3.21—HELICOPTER DATA, ESS

Location*	Time	Intensity (T1B), mr/hr	Probe intensity, mr/hr	Probe intensity, H+2 hr, mr/hr	Altitude above terrain, ft	Computed ground reading at time of reading, mr/hr
Initial Survey, 23 March 1955						
CQ	1255	1	1	0.15	160	2.8
Stake 950	1258	1	1	0.175	80	1.8
Gate 5	1301	0	0	0	120	0
C1	1303	500	1,000	220	120	1,150
DD	1305	0	0	0	100	0
DC	1308	1	1	0.25	140	2.5
DE	1312	0	1	0.28	10	0
DB	1315	2,000	15,000	4,700	140	5,000
1 mile S DB	1330	800	3,000	1,300	280	3,760
DA	1335	1,800	8,500	4,100	280	8 460
CG	1342	10,000	17,000	9,500	80	18,000
CF	1346	10,000	70,000	40,500	360	66,000
Stake 223	1355	12,000	17,000	12,000	200	39,600
Stake 218	1400	12,000	17,500	13,000	220	43,200
CK	1255	1	1	0.15	120	2.3
Stake 331	1630	2,000	10,000	23,000	250	8,200
Stake 325	1635	8,000	23,000	55,000	245	32,000
Stake 319	1640	11,000	42,000	98,000	250	45,100

*CQ (7500 ft az. 315° from T-10a); C1 (9000 ft az. 75° from T-10a); DD (14,100 ft az. 79° from T-10a); DC (16,650 ft az. 98.5° from T-10a); DE (22,800 ft az. 73° from T-10a); DB (13,800 ft az. 109° from T-10a); DA (22,050 ft az. 138° from T-10a); CG (9300 ft az. 112° from T-10a); and CF (7050 ft az. 125° from T-10a).

Table 3.22—DATA OBTAINED BY GROUND SURVEY PARTIES FROM CAMP DESERT ROCK, ESS*

Time	Location	Intensity, mr/hr	Average intensity, H+2 hr, mr/hr	Time	Location	Intensity, mr/hr	Average intensity, H+2 hr, mr/hr
			23 March 1955†				
1513	M-6	0.6		1545	D-12	0.2	
1518	M-5	24	37	1550	D-11	0.4	
1521	N-5	11	17	1600	D-10	1.2	2.3
1524	O-5	10	16	1605	D-9	1	
1526	P-5	6	9.5	1610	D-8	1	
1531	Q-5	5	8	1615	D-7	1	
1536	R-5	6	10	1622	D-6	20	44
1540	A-5	14	27	1522	E-13	1.7	2.7
1544	B-5	75	155	1603	E-12	0.8	1.6
1550	C-5	1,100	1,700	1635	E-11	2.6	5.9
1556	C-6	48	89	1658	E-10	3.6	9.0
1602	B-6	1	1.9	1545	F-13	1	1.7
1609	A-6	0.6	1.3	1620	F-12	1.4	3.2
1614	R-6	0.4		1640	F-11	0.6	1.4
1624	Q-6	0.4		1515	H-13	950	1,400
1631	P-6	0.2	0.48	1435	I-13	0.2	
1637	O-6	0.2		1450	I-12	4	4.8
1642	N-6	0.2		1455	I-11	44	60
1653	L-5	60	150	1510	I-10	100	140
1658	K-5	3,700	8,800	1518	I-9	310	460
1705	J-5	4,000	9,500	1523	I-8	315	500
1710	J-6	1,900	5,000	1528	I-7	800	1,300
1535	D-13	0.1		1538	I-6	3,100	5,000
			24 March 1955				
1100	J-6	230		1100	D-6	2	
1109	K-5	490		1105	D-5	460	8,500
1111	K-6	20	380	1113	D-4	2,600	
1115	L-6	1.8		1120	D-3	6,000	
1120	L-5	6		1128	D-2	12,000	
1124	L-4	2,200		1125	E-10	2.4	
1129	M-5	4		1140	E-9	2.8	52
1133	M-4	100		1150	E-8	3.4	
1136	M-3	4,100		1200	E-7	37	
1140	N-4	31		1205	E-6	600	
1146	N-3	3,800		1215	E-5	1,300	
1149	O-3	180		1220	E-4	3,600	
1155	O-4	14		1150	F-10	0.8	15
1159	P-4	9		1210	F-9	1.6	32
1201	P-3	100		1215	F-8	40	800
1207	Q-3	100		1223	F-7	110	2,100
1210	Q-4	10		1227	F-6	180	
1213	R-4	15		1233	F-5	340	
1216	A-4	38		1237	F-4	2,200	
1220	A-5	4.2		1242	F-3	5,500 (reading taken ~30 yd E of F-3)	
1223	B-5	8					
1226	B-4	3,100					
1231	C-5	90	1750				
1236	C-6	5	97				

Table 3.22 — (Continued)

Time	Location	Intensity, mr/hr	Average intensity, H+2 hr, mr/hr	Time	Location	Intensity, mr/hr	Average intensity, H+2 hr, mr/hr
			24 March 1955				
1130	G-13	2	38	1220	H-9	150	
1150	G-12	8	150	1232	H-8	400	7,800
1205	G-11	23	430	1240	H-7	260	
1220	G-10	36	690	1243	H-6	460	8,800
1240	G-9	45	880	1246	H-5	3,000	
1250	G-8	60	1,200	1055	I-11	3	60
1300	G-7	950	18,000	1110	I-10	8	160
1310	G-6	1,900		1120	I-9	24	
1315	G-5	3,600		1125	I-8	32	600
1110	H-13	48		1130	I-7	90	1,300
1120	H-12	42		1137	I-6	320	
1156	H-11	40	750	1143	I-5	800	
1212	H-10	80	1,600	1145	I-4	3,600	
			25 March 1955				
1027	J-6	80		1050	F-7	80	
1032	J-5	200		1055	F-6	100	
1036	K-5	180		1100	F-5	220	
1040	K-6	7		1102	F-4	1,400	
1042	L-5	2.8		1205	F-3	8,000	
1048	L-4	800		1207	F-2	16,000	
1050	M-4	36		1040	G-11	10	
1052	M-3	1,000		1055	G-10	16	
1057	N-4	10		1110	G-9	25	
1055	N-3	1,500		1120	G-8	42	
1100	O-3	60		1140	G-7	340	
1101	O-2	2,000		1145	G-6	900	
1105	P-3	40		1150	G-5	1,900	
1107	P-2	3,000		1151	G-4	4,400	
1110	Q-3	33		1152	G-3	9,900	
1115	Q-2	1,100		1030	H-13	26	
1118	R-3	48		1040	H-12	26	
1120	A-4	15		1100	H-11	16	
1125	B-4	1,300		1110	H-10	34	
1129	C-4	1,100		1120	H-9	80	
1132	C-5	38		1130	H-8	230	
1112	R-2	800		1137	H-7	130	
1000	D-5	200		1140	H-6	220	
1005	D-4	800		1145	H-5	1,200	
1009	D-3	2,300		1147	H-4	11,000	
1012	D-2	5,000		1150	H-3	12,000	
1015	D-1	16,000		1017	I-9	12	
1039	E-7	2		1021	I-8	16	
1048	E-6	285		1025	I-7	30	
1053	E-5	800		1027	I-6	100	
1058	E-4	1,950		1030	I-5	360	
1102	E-3	4,000		1032	I-4	1,700	
1105	E-2	12,000		1033	I-3	8,000	
1040	F-8	28					

Table 3.22—(Continued)

Time	Location	Intensity, mr/hr	Average intensity, H+2 hr, mr/hr	Time	Location	Intensity, mr/hr	Average intensity, H+2 hr, mr/hr
			26 March 1955				
0949	J-6	90		1051	E-3	2,750	
0945	J-5	140		1053	E-2	8,000	
0948	J-4	420		1145	F-8	15	
0953	K-5	150		1152	F-7	40	
0950	K-4	460		1154	F-6	60	
0957	L-4	650		1158	F-5	100	
1000	L-3	650		1200	F-4	700	
1005	M-4	28		1202	F-3	4,200	
1003	M-3	1,400		1205	F-2	12,000	
1008	N-3	1,050		1000	G-9	40	
1010	N-2	4.000		1010	G-8	80	
1015	O-3	36		1020	G-7	220	
1012	O-2	1,500		1025	G-6	460	
1017	P-3	23		1030	G-5	1,100	
1018	P-2	2,100		1034	G-4	3,900	
1023	Q-3	20		1033	G-3	5,000	
1020	Q-2	150		1000	H-13	16	
1025	R-3	30		1035	H-12	10	
1028	R-2	1,000		1100	H-11	10	
1031	A-3	1,000		1120	H-10	18	
1030	A-2	4,400		1130	H-9	34	
1035	B-4	900		1140	H-8	100	
1032	B-3	1,800		1155	H-7	60	
1037	C-4	900		1200	H-6	100	
1040	C-5	28		1205	H-5	600	
0945	D-5	140		1209	H-4	3,200	
0949	D-4	800		1211	H-3	7,500	
0952	D-3	1,800		0945	I-7	18	
0954	D-2	3,600		0950	I-6	120	
0958	D-1	14,000		0955	I-5	300	
1045	E-6	170		1000	I-4	1,200	
1047	E-5	400		1005	I-3	4,200	
1049	E-4	1,000		1003	I-2	7,000	
			27 March 1955				
0550	J-6	48		0630	P-3	20	
0555	J-5	110		0629	P-2	1,400	
0558	J-4	290		0635	Q-2	500	
0602	K-5	100		0628	Q-1	2,700	
0605	K-4	310		0639	R-3	22	
0606	K-3	700		0637	R-2	600	
0610	L-4	480		0642	A-3	700	
0609	L-3	400		0644	A-2	2,800	
0614	M-4	26		0648	B-4	600	
0616	M-3	800		0645	B-3	1,200	
0619	N-3	500		0650	C-4	600	
0620	N-2	2,600		0653	C-5	2	
0623	O-3	30		0627	P-1	3,500	
0625	O-2	950		0535	D-5	100	

Table 3.22—(Continued)

Time	Location	Intensity, mr/hr	Average intensity, H+2 hr, mr/hr	Time	Location	Intensity, mr/hr	Average intensity, H+2 hr, mr/hr
			27 March 1955				
0539	D-4	450		0618	G-5	900	
0542	D-3	1,400		0620	G-4	2,600	
0545	D-2	2,800		0622	G-3	6,000	
0547	D-1	10,000		0624	G-2	9,000	
0640	E-6	120		0535	H-9	40	
0643	E-5	240		0555	H-8	100	
0647	E-4	700		0600	H-7	80	
0650	E-3	1,900		0605	H-6	110	
0656	E-2	5,500		0610	H-5	900	
0545	F-7	33		0612	H-4	3,100	
0550	F-6	40		0613	H-3	8,000	
0555	F-5	85		0615	H-2	12,000	
0557	F-4	490		0616	H-1	20,000	
0600	F-3	3,500		0555	I-6	60	
0602	F-2	10,000		0600	I-5	200	
0540	G-9	20		0603	I-4	600	
0550	G-8	26		0607	I-3	2,800	
0605	G-7	240		0609	I-2	8,000	
0615	G-6	420					

* Locations are Program 2 stations as shown on AMS map 2758II and 2758III, Fig. 3.37; e.g., M-6 is radial line M and ring 6.

† This team received 300 mr on its dosimeters on the way to Station G-13. The team reached a point two-thirds of the distance between Stations H-13 and G-13, where, at the 5000-ft contour line shown on the map, a T1B reading of approximately 3000 mr/hr was observed.

Table 3.23—DATA OBTAINED BY PROJECT 2.5.1, ESS*

Location	Intensity, mr/hr	Time	Computed intensity at H+2 hr, mr/hr
		23 March 1955	
G-7	11,000	1720	32,000
G-8	800	1705	2,000
L-5	40	1900	160
E-7	60	1745	190
E-8	20	1800	68
F-7	1,100	1730	3,300
F-8	700	1650	1,750
F-11	0.8	1620	1.7
		24 March 1955	
H-7	170	1400	3,400
H-8	360	1345	7,000

* Locations are Program 2 stations as shown on AMS map 2758II and 2858III, Fig. 3.37; e.g., M-6 is radial line M and ring 6.

Table 3.24— DATA OBTAINED BY PROJECT 37.2 ON D-DAY, ESS

Location	Computed intensity at H+2 hr, mr/hr
5 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	1.6
6 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	1.6
7 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	1.6
8 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	12
9 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	2.2
11 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	17
12 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	75
12.5 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	310
13.5 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	475
14 miles S of junction of Papoose Road and Groom Lake Road on Papoose Road	380
Indian Spring Road:	
12.1 miles S of Groom Lake	47
9 miles S of Groom Lake	4
23 miles S of Groom Lake	88
25 miles S of Groom Lake	240
29 miles S of Groom Lake	95
Sheep Canyon Road:	
43.3 miles N of Highway 95	12
37.1 miles N of Highway 95	80
34.1 miles N of Highway 95	70
23.5 miles N of Highway 95	7.5

Table 3.25—DATA OBTAINED BY PROGRAM 2 WITH A CORPS OF ENGINEERS "PATHFINDER," ESS

Coordinates N	Coordinates E	Intensity, mr/hr	Time	Computed intensity at H+2 hr, mr/hr
		23 March 1955		
834	173	2	1530	47
784	175	3	1531	70
702	186	4	1532	92
617	196	1.9	1533	43
590	200	1.3	1534	30
611	170	5	1540	115
610	170	2.4	1541	54
605	147	2	1542	47
573	832	2	1550	47
547	825	6.5	1600	150
528	802	9	1601	200
490	745	12	1604	275
488	745	12	1650	290
435	741	70	1710	1700
351	765	90	1715	2200
284	783	58	1718	1200
010	751	65	1735	1600
755	641	3	1750	75

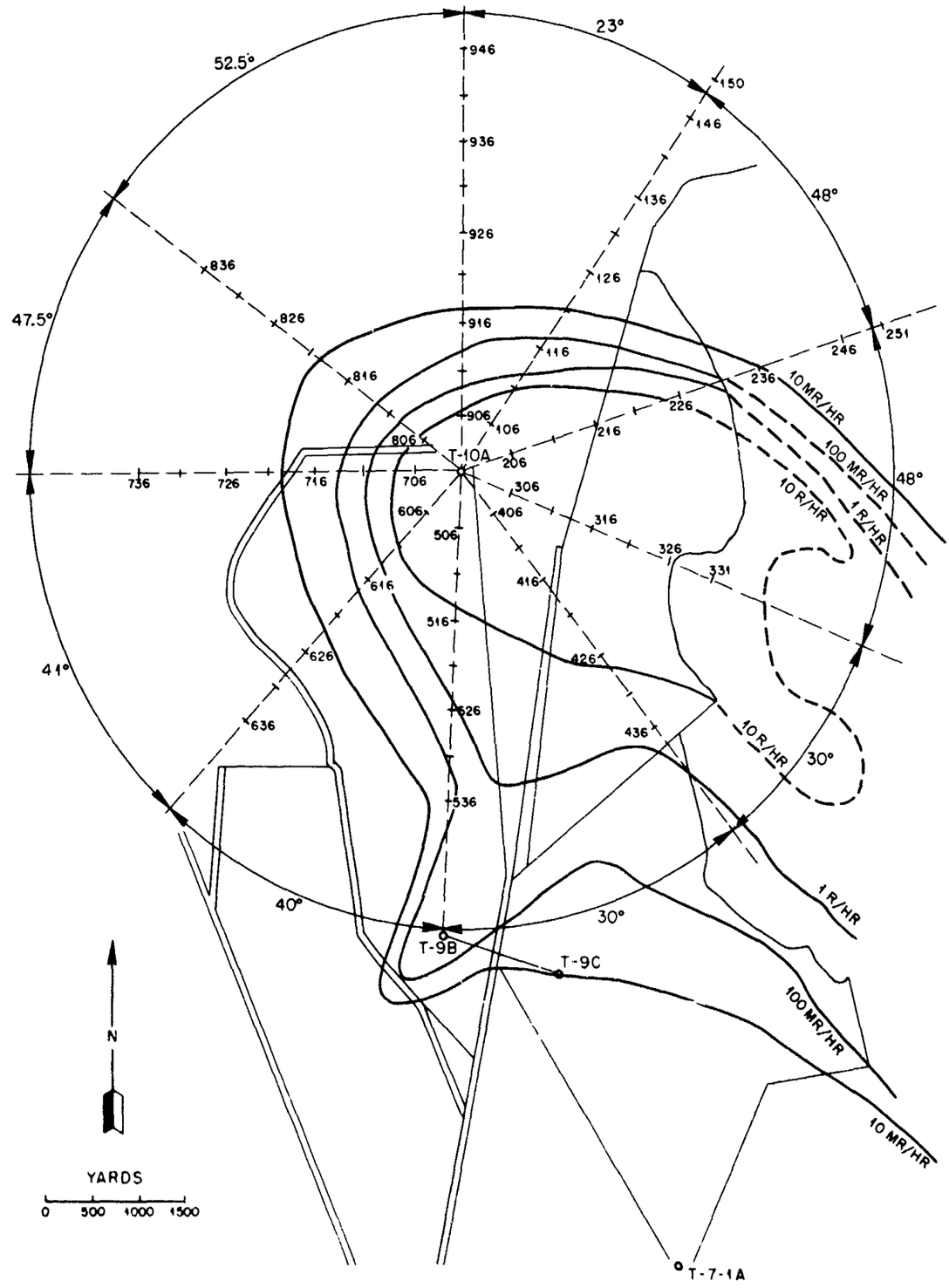


Fig. 3.38—Initial survey, Ess. Area, T-10a; date, 23 March 1955.

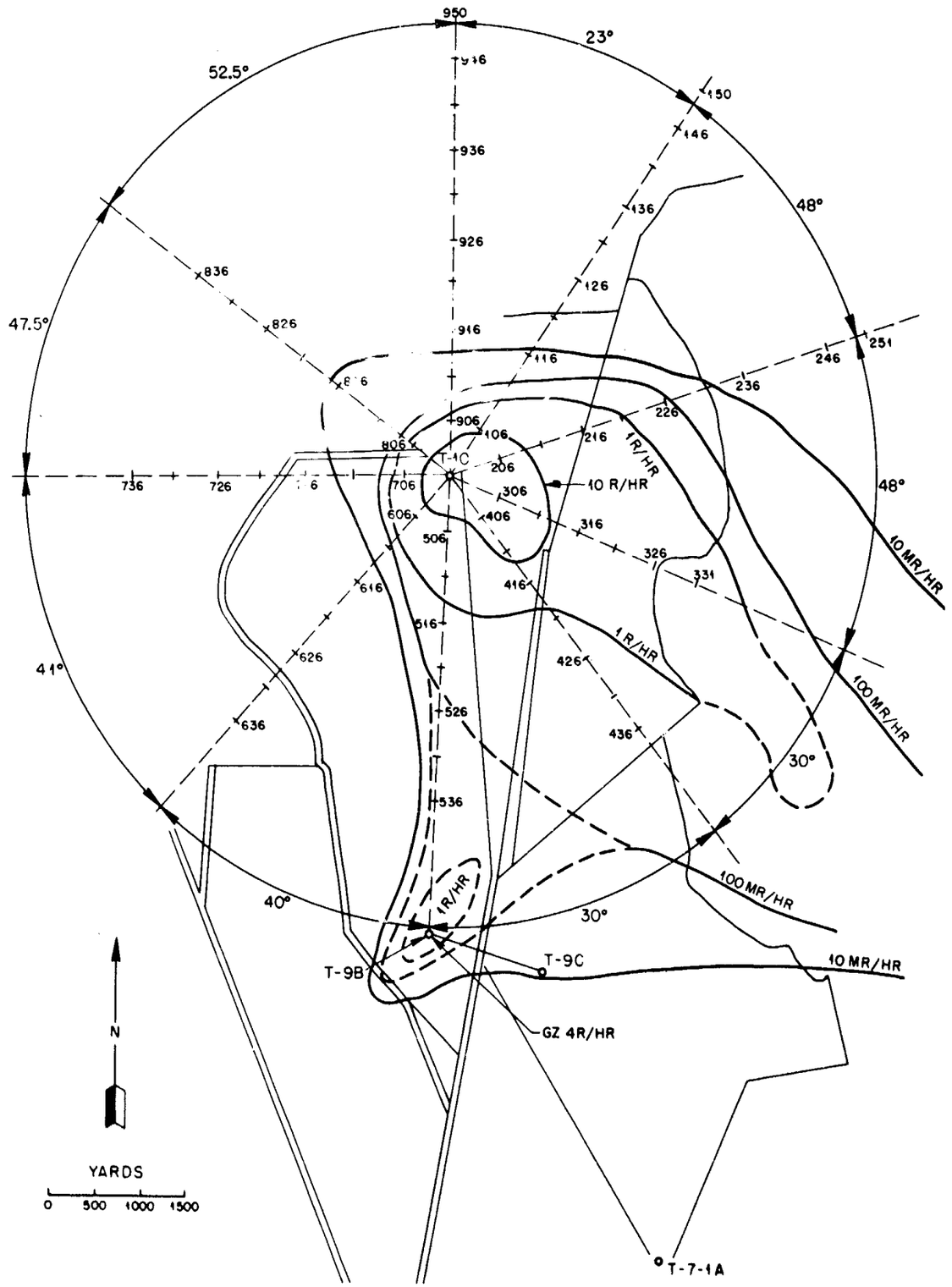


Fig. 3.39—Resurvey 1, Ess. Area, T-10a; date, 24 March 1955; survey time, 0630 to 0830 hr.

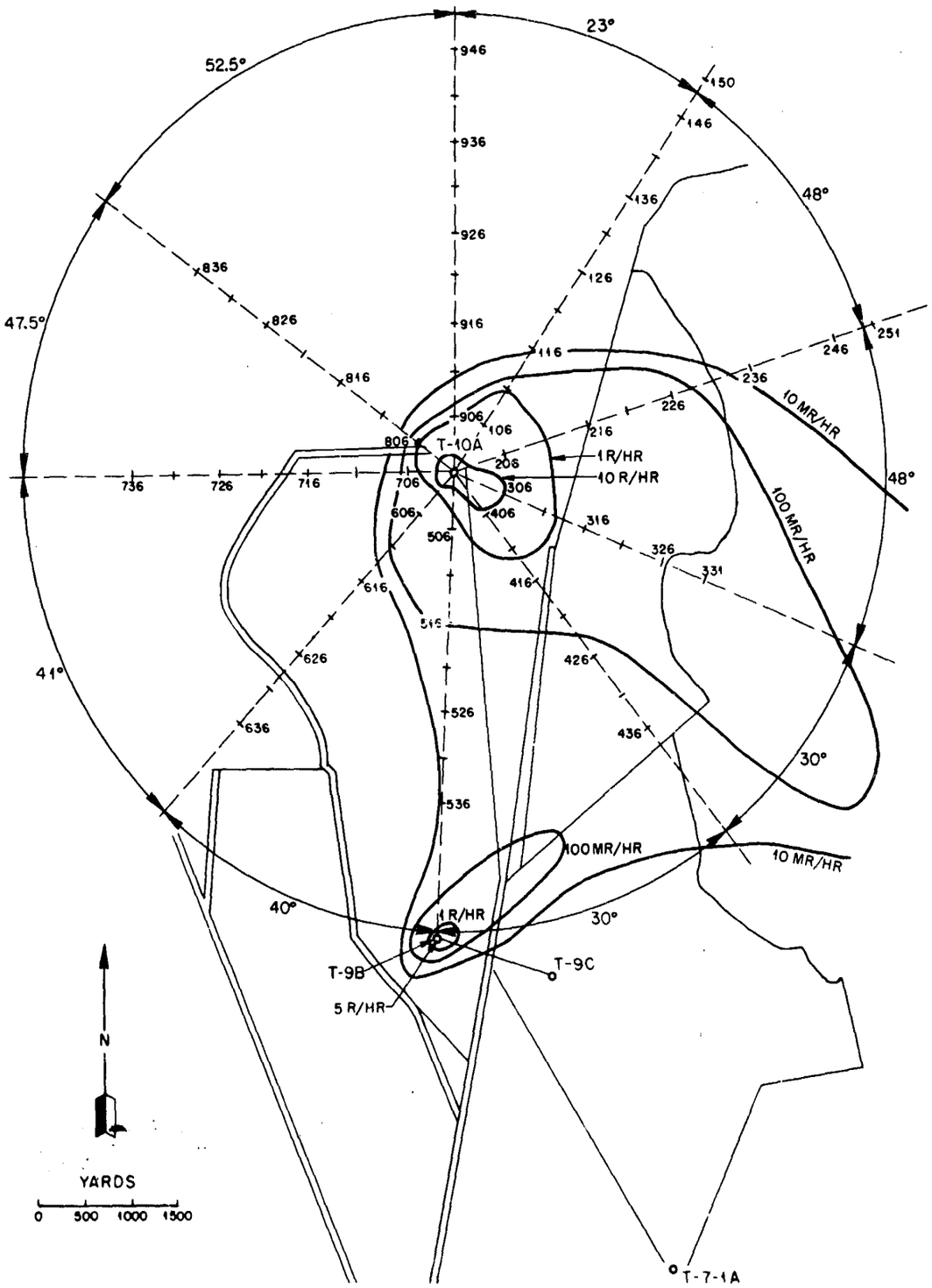


Fig. 3.40—Resurvey 2, Ess. Area, T-10a; date, 26 March 1955; survey time, 0645 to 0800 hr.

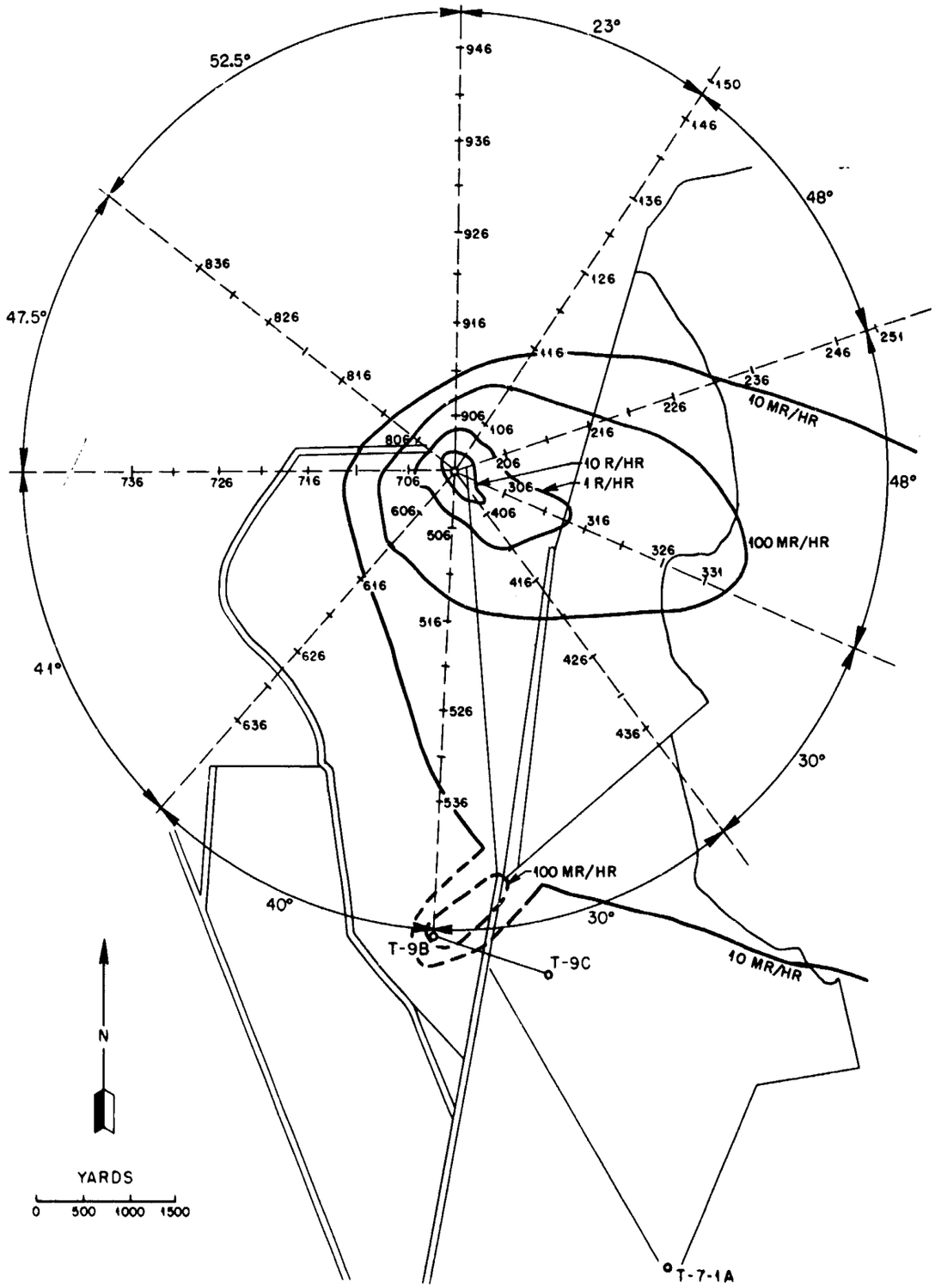


Fig. 3.41—Resurvey 3, Ess. Area, T-10a; date, 30 March 1955; survey time, 0900 to 1500 hr.

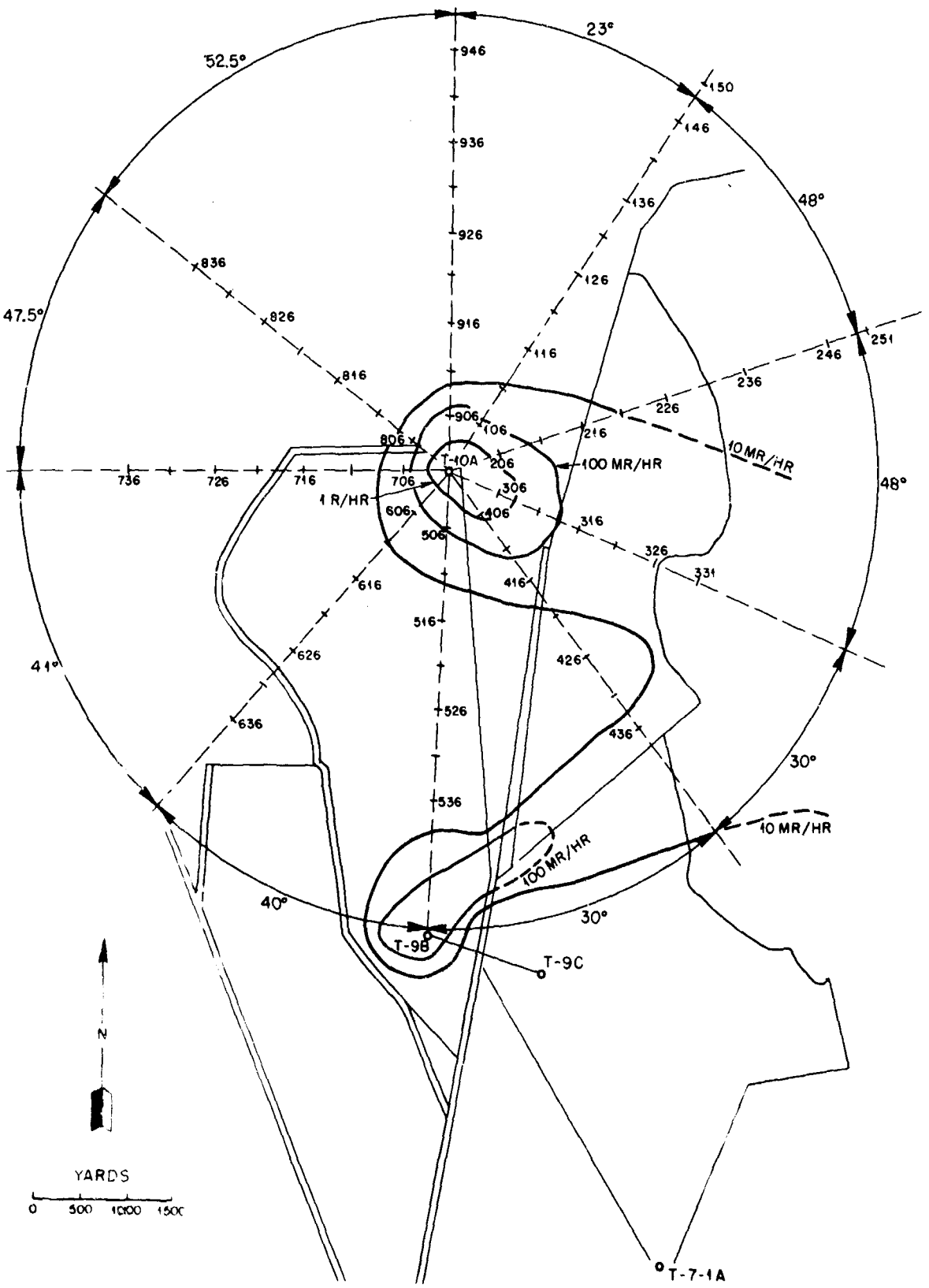


Fig. 3.42 — Resurvey 4, Ess and Tesla. Areas T-10a and T-9b; date, 6 April 1955.

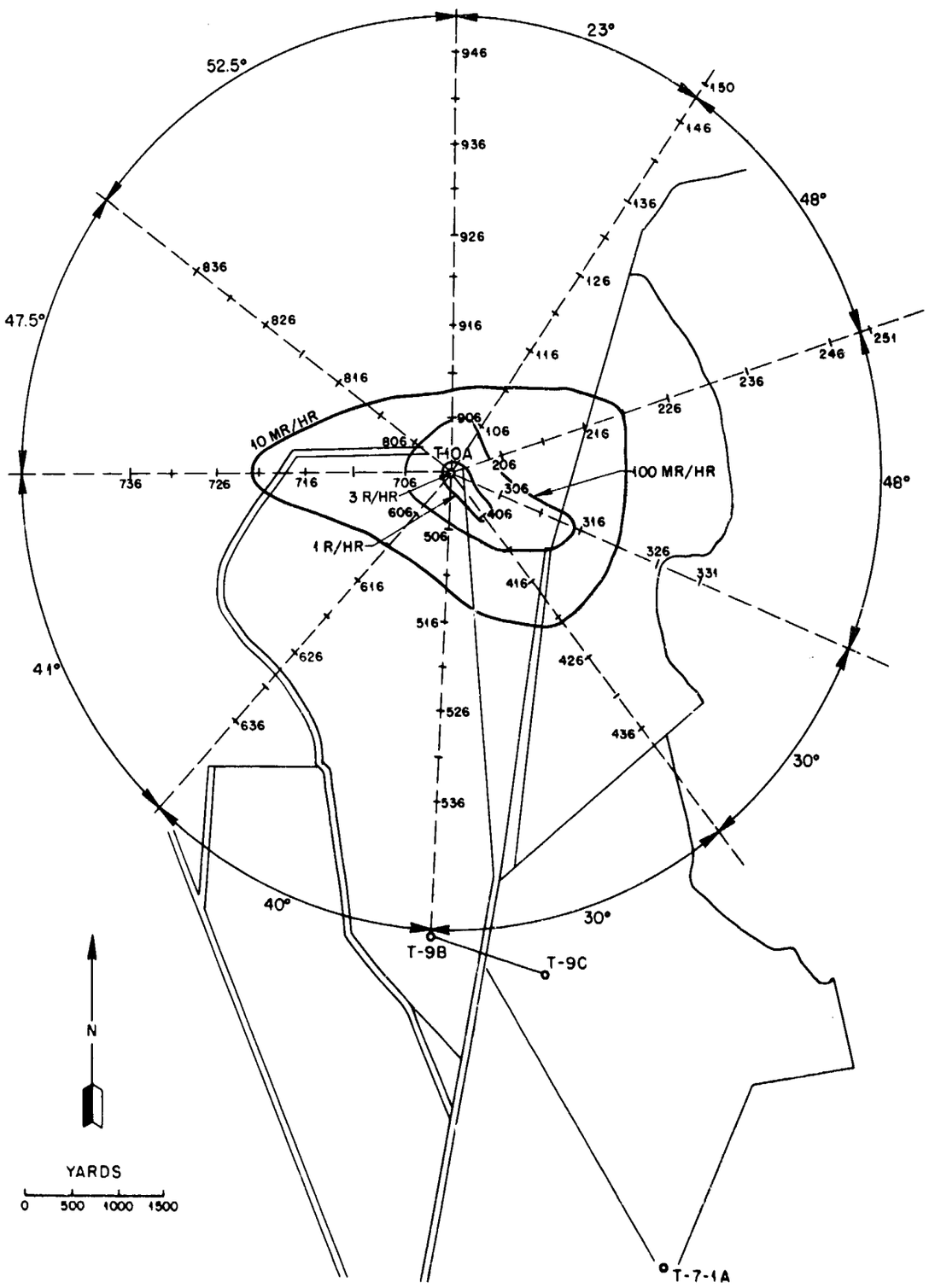


Fig. 3.43—Resurvey 5, Ess. Area, T-10a; date, 12 April 1955.

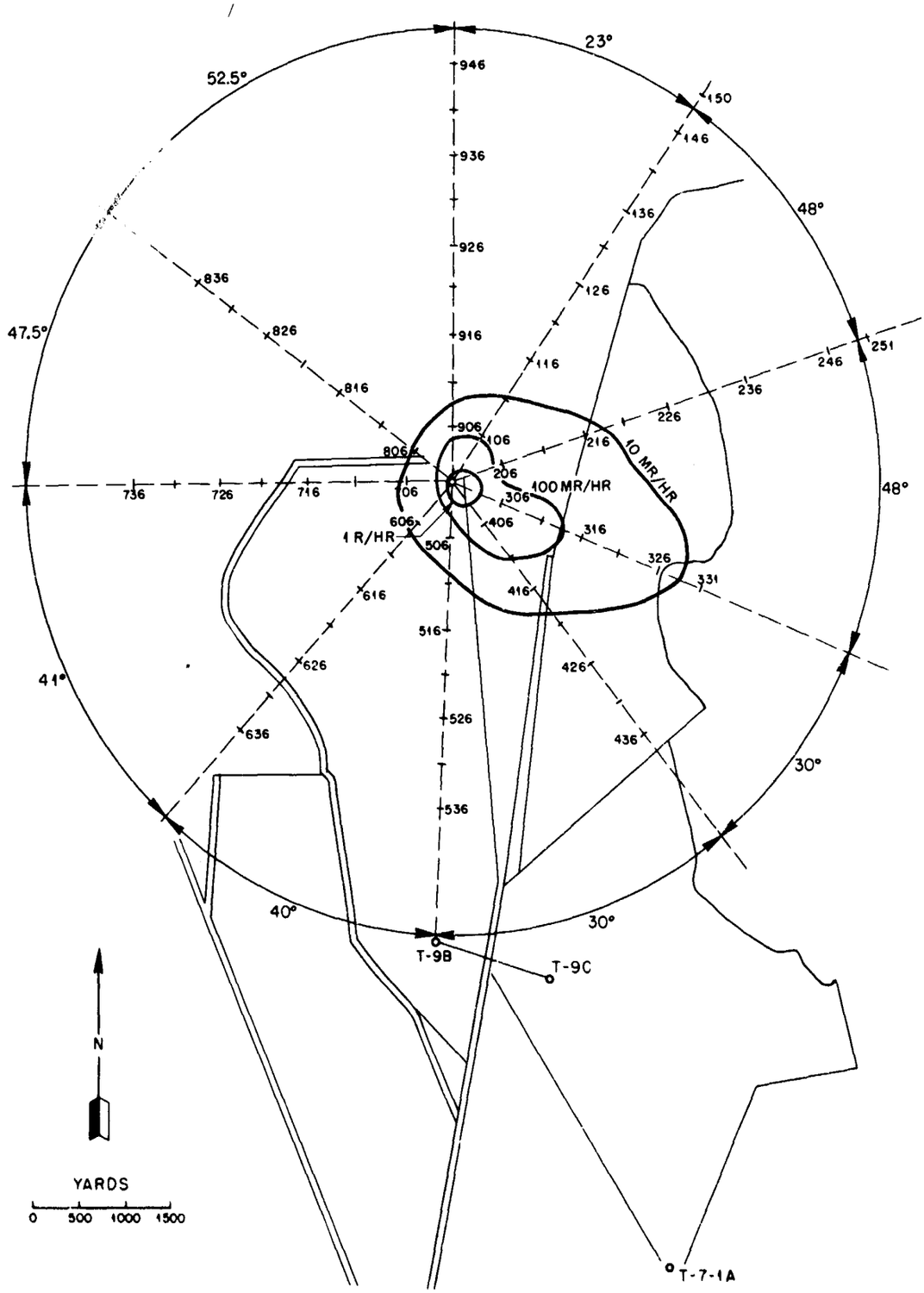


Fig. 3.44—Resurvey 6, Ess. Area, T-10a; date, 21 April 1955.

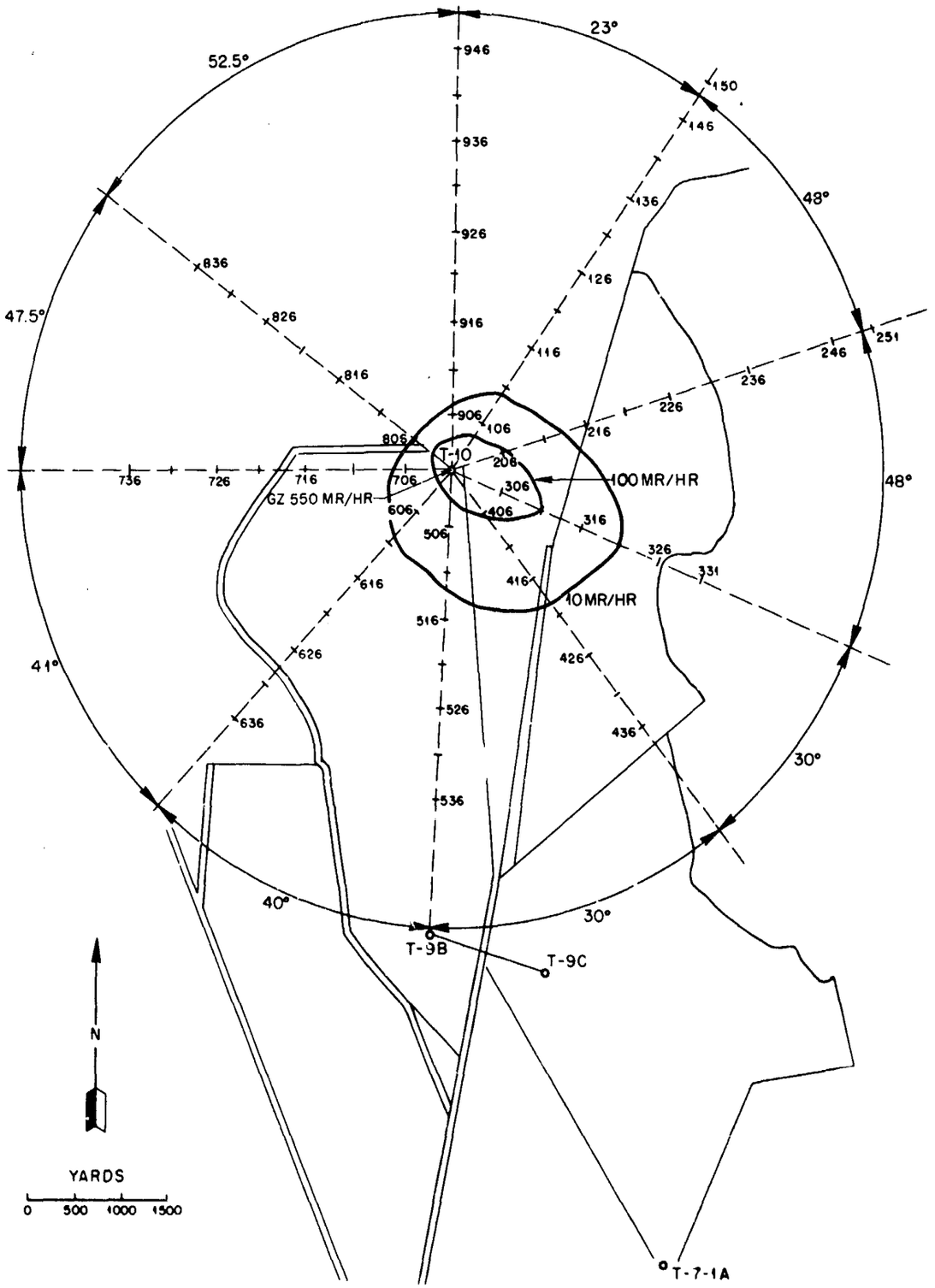


Fig. 3.45—Resurvey 7, Ess. Area, T-10a; date, 4 May 1955; survey time, 1045 to 1054 hr.

Table 3.26—RESULTS OF SURVEYS, APPLE

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey,* 29 March 1955			
215.5	10	0527	411.0	100	0537
210.5	100	0530	409.5	1,000	0539
207.0	1,000	0532	408.7	10,000	0541
203.5	10,000	0534	515.8	10	0545
Tower 2 stakes:			511.2	100	0547
315.9	10	0635	507.2	1,000	0550
319.3	100	0636	509.3	10,000	0553
321.2	1,000	0637	615.1	10	0609
327.9	10,000	0640	607.3	1,000	0605
315.0	10	0607	816.0	10	0620
310.0	100	0609	810.0	100	0625
309.0	1,000	0611	805.2	1,000	0627
308.4	10,000	0612	805.5	10,000	0629
415.0	10	0535			
		Resurvey 1, 30 March 1955 .			
311	10	0707	103.5	1,000	0743
307	100	0709	102	10,000	0745
304	1,000	0711	812	10	0715
303	10,000	0715	808.2	100	0722
411	10	0735	806.5	1,000	0723
407	100	0738	805	10,000	0725
405	1,000	0740	511.3	10	0704
403	10,000	0742	507.0	100	0707
209.2	10	0700	505.2	1,000	0708
203.8	100	0702	503	10,000	0710
201.5	1,000	0705	602.3	10,000	0717
201	10,000	0706	606	1,000	0716
125	10	0730	608.5	100	0715
107	100	0740	612	10	0718
		Resurvey 2, 1 April 1955			
205	10	1122	102	1,000	1222
203	100	1123	809.2	10	1235
201.5	1,000	1125	806.7	100	1237
GZ	9,000	1130	804.7	1,000	1238
107	10	1220	307.5	10	1358
104	100	1221	303.8	100	1400

Table 3.26—(Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 2, 1 April 1955			
302	1,000	1405	606	100	1436
407	10	1410	604.2	1,000	1438
404.5	100	1413	GZ Area 2	2,000	1455
402.1	1,000	1415	Stakes in Area 2:		
505.7	10	1425	225	10	1500
504	100	1427	234	16 max.	1501
502.2	1,000	1429	Check point C†	6	1503
607.4	10	1435	GZ Area 9b	1,400	1529
		Resurvey 3, 12 April 1955			
603.5	10	0830	404.5	10	0848
601.7	100	0831	401.7	100	0849
600.5	1,000	0833	400.5	1,000	0851
GZ	2,100	0834	528 yd N of GZ	10	0901
200.5	1,000	0840	352 yd N of GZ	100	0905
201.7	100	0841	176 yd N of GZ	1,000	0915
204.5	10	0842			
		Resurvey 4, 20 April 1955			
202.7	10	1500	200 yd W of T-4	100	1518
201	100	1503	300 yd W of T-4	10	1520
GZ (T-4)	800	1505	402	100	1525
803	10	1508	403.5	10	1528
802	100	1514			
		Resurvey 5, 4 May 1955			
202.7	10	0903	602.6	10	0932
201	100	0906	602	100	0933
GZ	450	0912	602.5	100	0950
402.7	10	0925	803.5	10	0951
402	100	0926			

*Stake line 1 was reading over 10 r/hr; no readings were obtained.

† Check point C, 8200 ft az. 276° from T-9b.

Table 3.27—HELICOPTER DATA, APPLE

Location	Intensity (T1B), mr/hr	Probe intensity, mr/hr	Altitude above terrain, ft	Time	Computed ground reading,* mr/hr
Initial Survey, 29 March 1955					
Z (12,000 ft az. 190° from T-9b)	0	0	Surface	0535	
CB (9800 ft az. 49° from T-7-1a)	10	0	Surface	0540	10
S (14,000 ft az. 57.5° from T-3)	0	0	Surface	0545	
BX (1500 ft az. 262° from T-4)	40,000	475	30	0605	50,000
CT (1100 ft az. 346° from T-4)	2,000	500	100	0608	40,000
BV (300 ft az. 85° from T-4)	300	150	30	0610	375

* Computed ground reading taken from "Correlation Curves for Air to Ground Readings," 3 April 1953, Operation Upshot-Knothole Rad-Safe Report WT-817, Chap. 14.

Table 3.28—MISCELLANEOUS READINGS, APPLE

Location	Intensity, mr/hr	Time
Initial Survey, 29 March 1955		
Area 1	Clear	0516
Stake 236	Clear	0523
F. Flat	Clear	0527
Point C (8200 ft az. 276° from T-9b)	10,000	0530
0.7 mile S of C	1,000	0533
1.1 miles S of C	100	0536
1.9 miles S of C	10	0538
DS (10,500 ft az. 139° from T-4)	1	0600
BX (1500 ft az. 262° from T-4)	10,000	0607
AD (1860 ft az. 280° from T-4)	100	0602
BX (1500 ft az. 262° from T-4)	3,500	1215
30 March 1955		
Point C (1400 ft S)	40	1048
Point D (11,200 ft az. 90° from T-1)	200	1051
Stake 224 of T-2	100	1053
AI (10,000 ft az. 310° from T-9b)	70	1106
0.92 mile S of BC	100	1110
BC (1700 yd az. 280° from T-10a)	25	1115

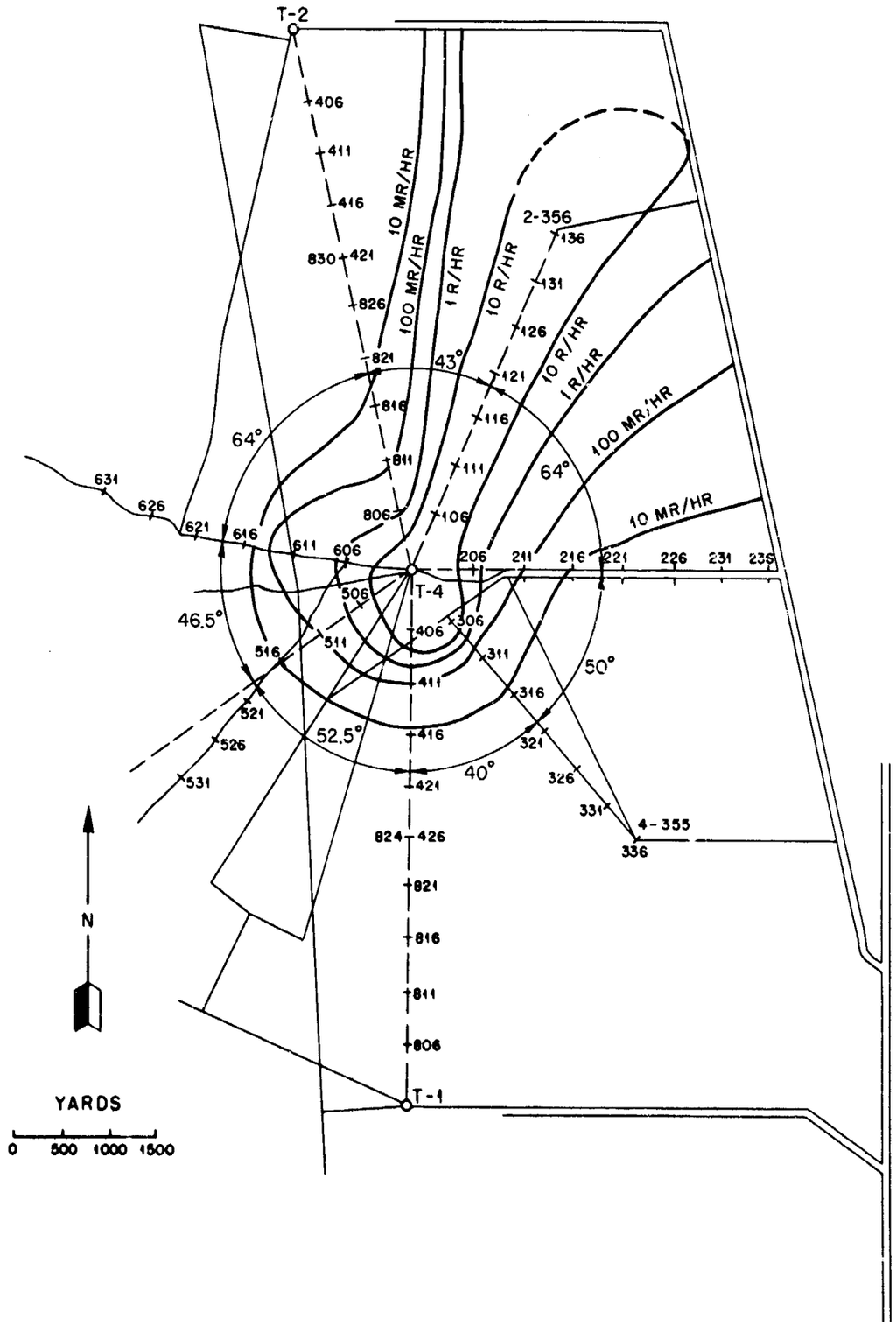


Fig. 3.46—Initial survey, Apple. Area, T-4; date, 29 March 1955; survey time, 0527 to 0640 hr.

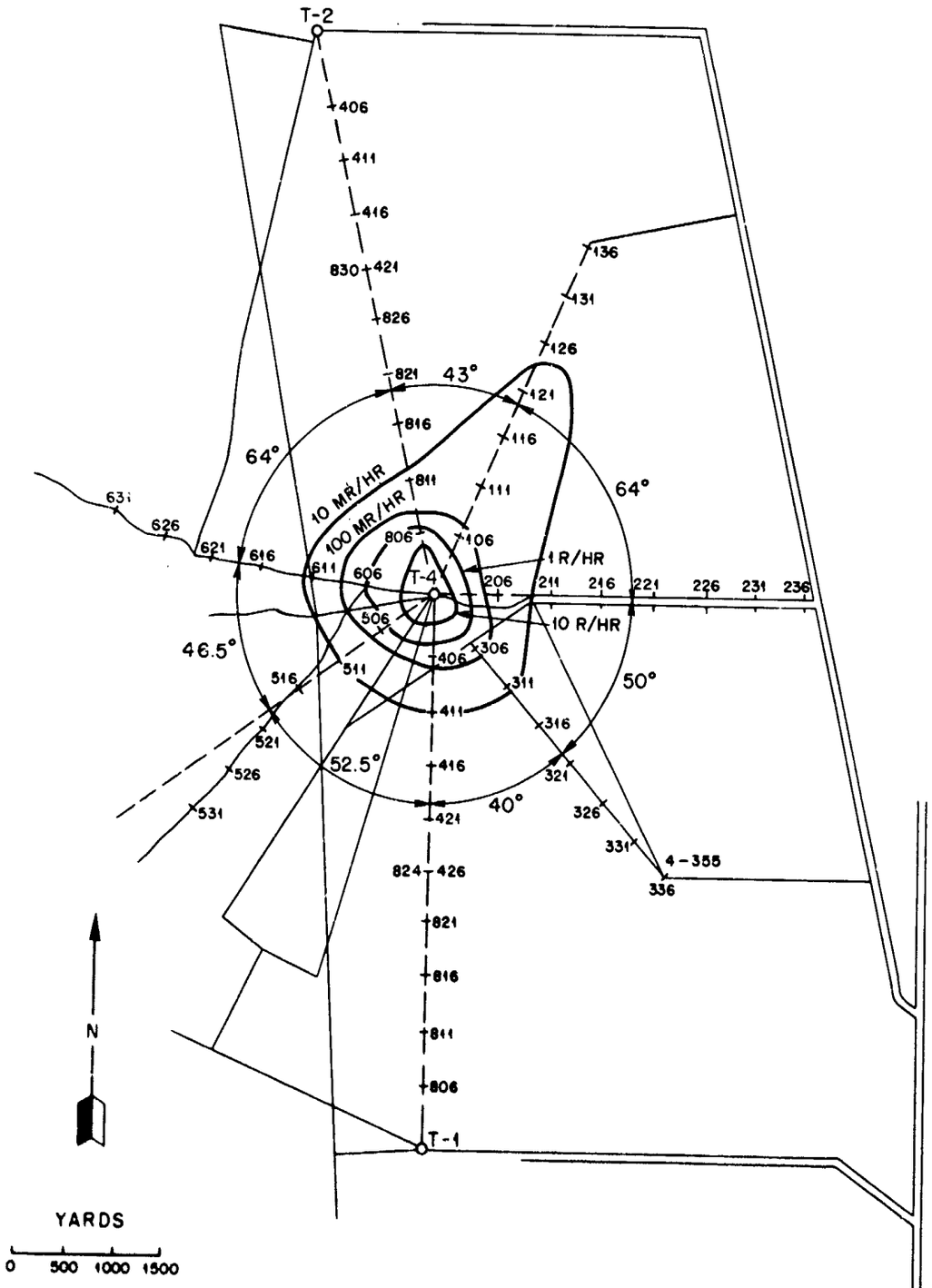


Fig. 3.47—Resurvey 1, Apple. Area, T-4; date, 30 March 1955; survey time, 0645 to 0745 hr.

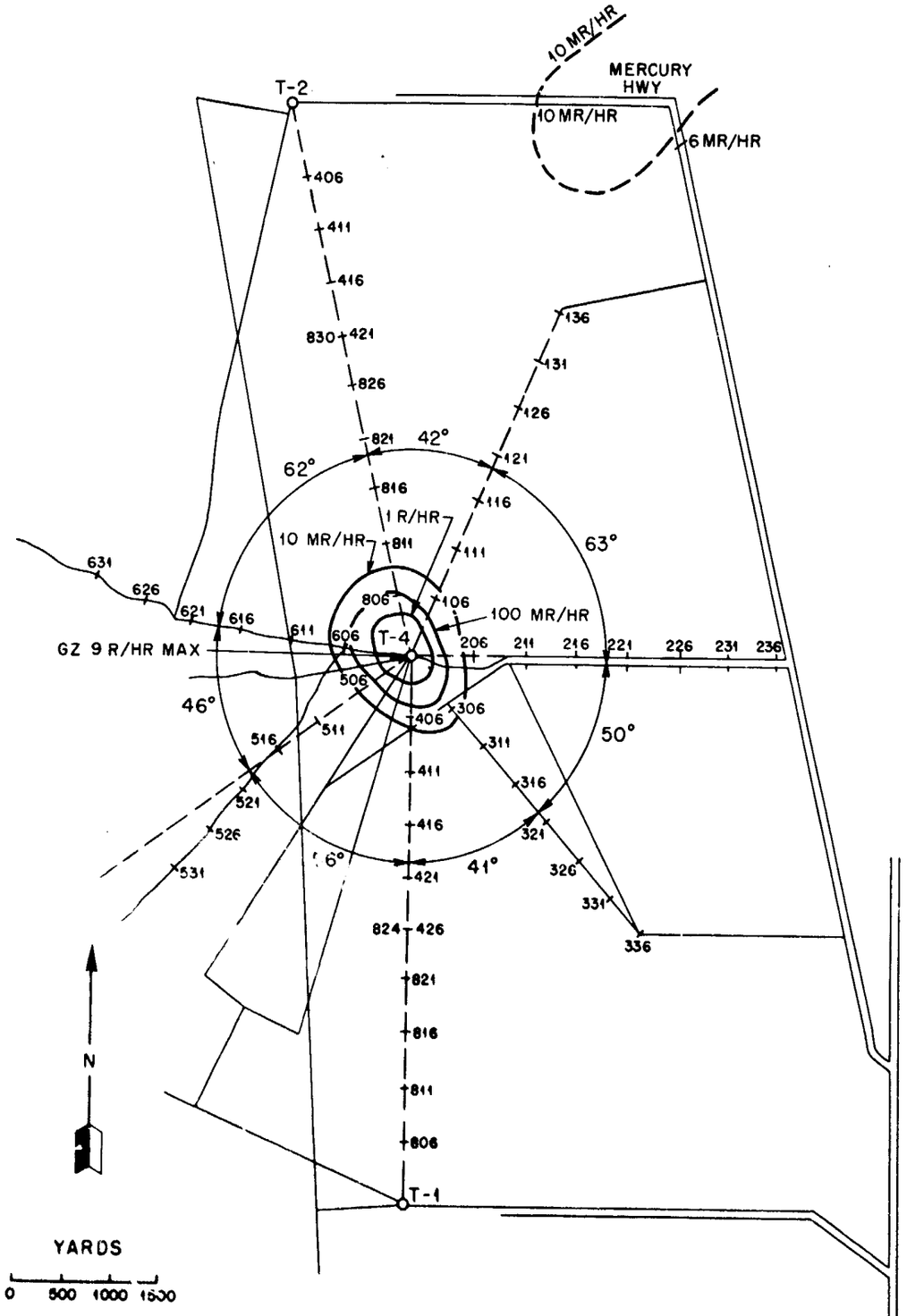


Fig. 3.48—Resurvey 2, Apple. Area, T-4; date, 1 April 1955; survey time, 1122 to 1430 hr.

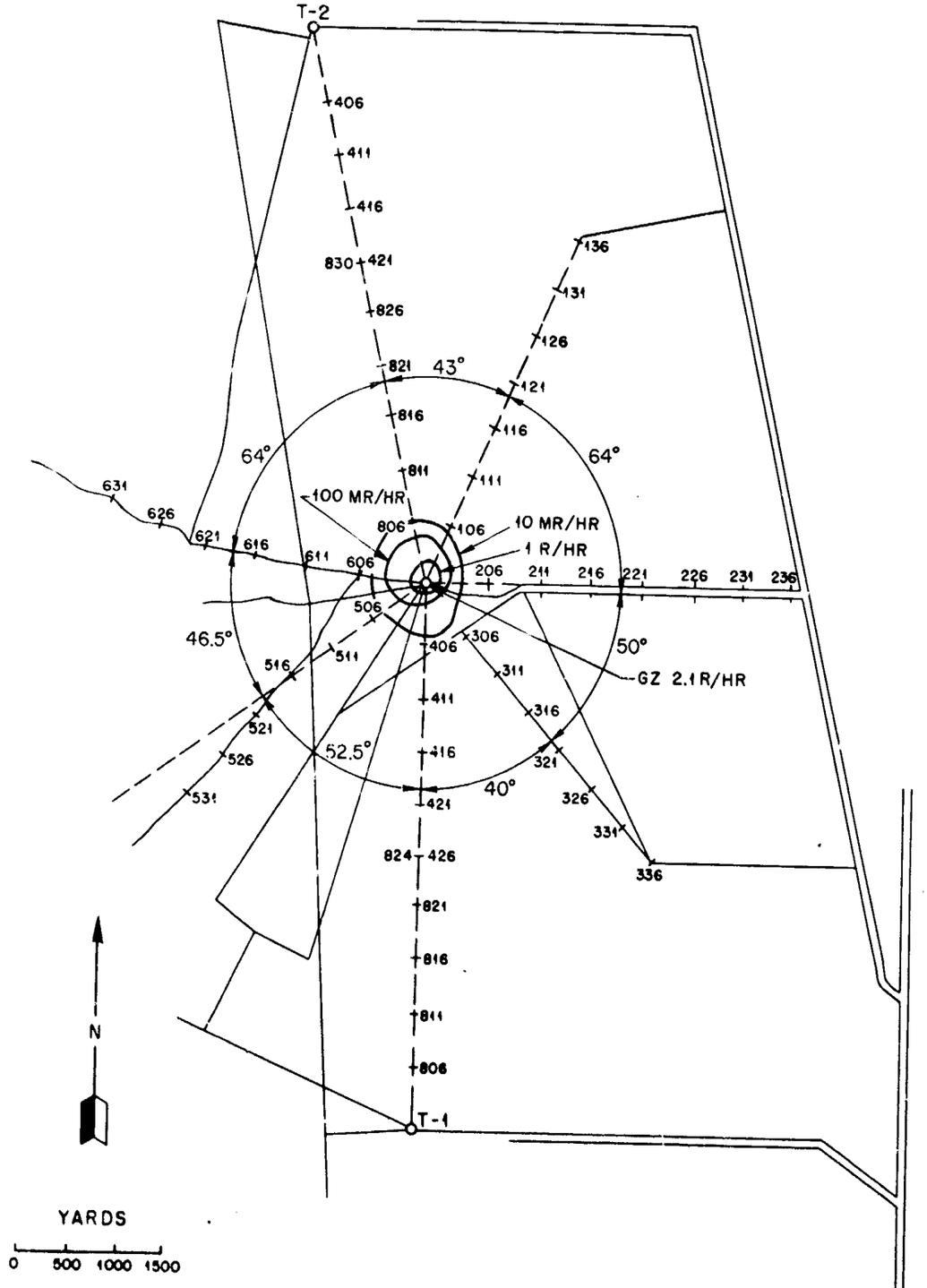


Fig. 3.49—Resurvey 3, Apple. Area, T-4; date, 12 April 1955; survey time, 0830 to 0915 hr.

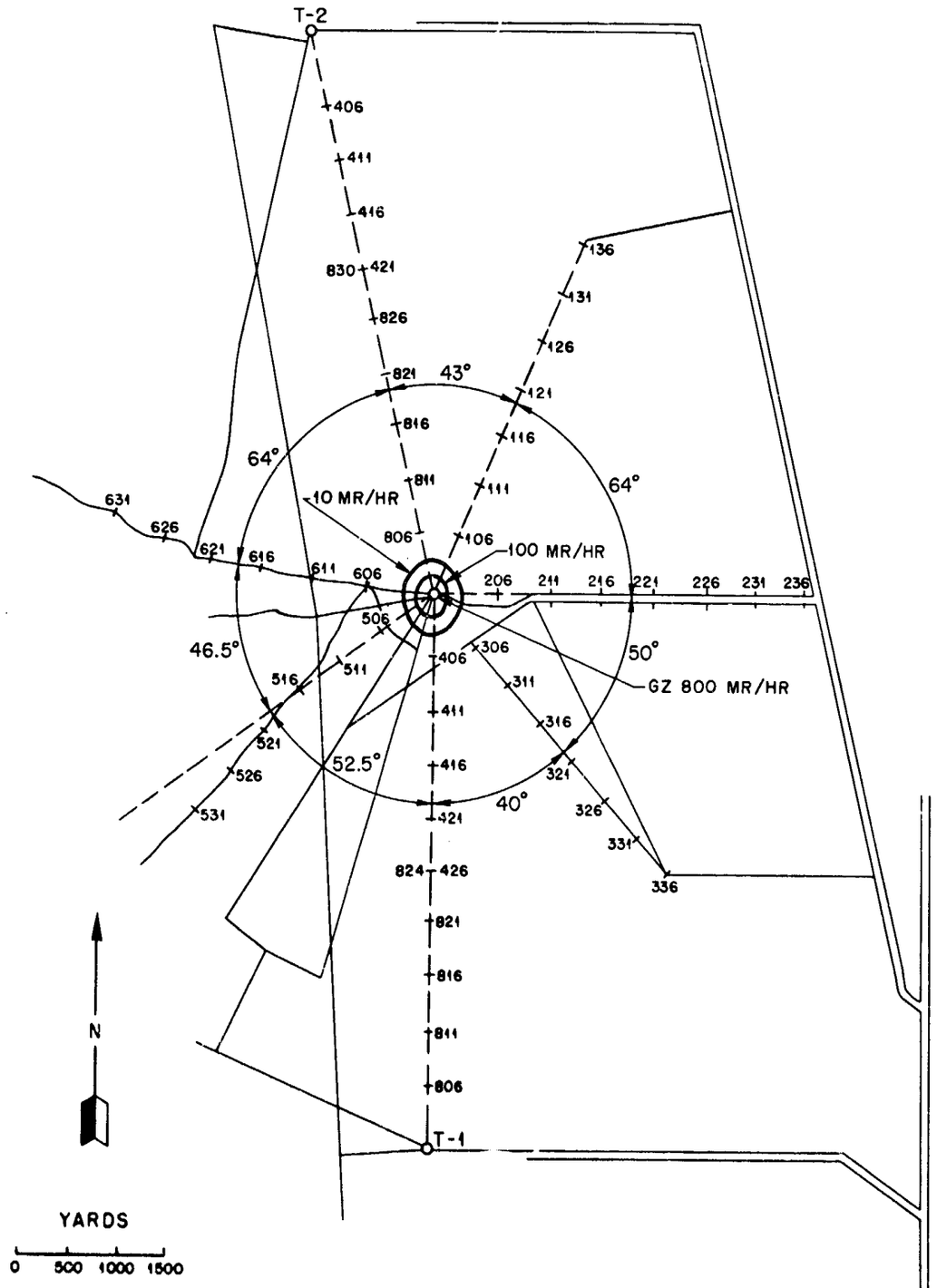


Fig. 3.50—Resurvey 4, Apple. Area, T-4; date, 20 April 1955; survey time, 1500 to 1528 hr.

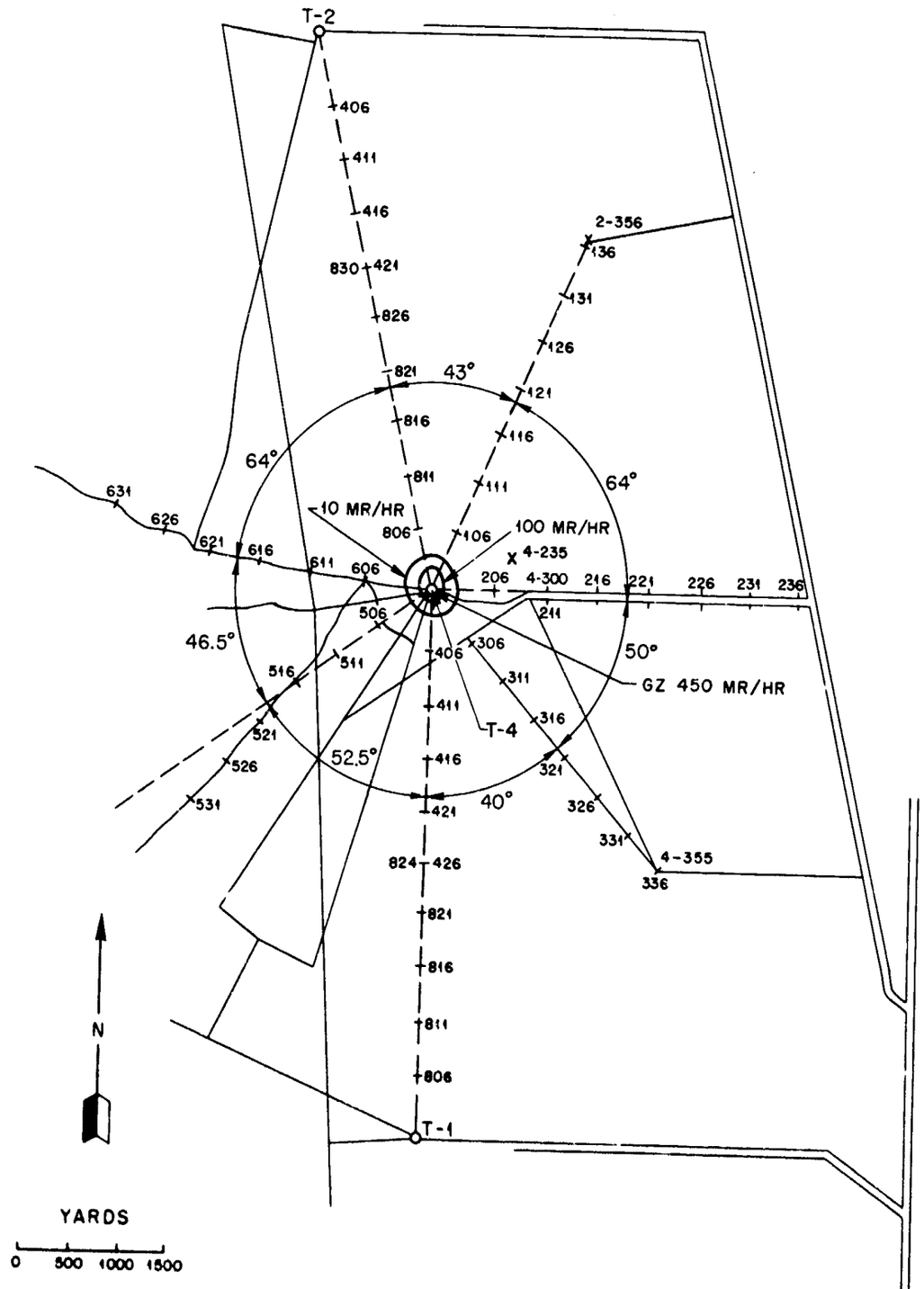


Fig. 3.51—Resurvey 5, Apple, Area, T-4; date, 4 May 1955; survey time, 0903 to 0951 hr.

The helicopter survey was accomplished between 1020 and 1045 hr. A reading of approximately 40 r/hr was obtained at Station 7-300. Considerable radio interference was experienced during the helicopter survey. This was at first thought to have been caused by a defective relay in the helicopter radio transmitter. The trouble was later determined to have been caused by a teletypewriter operated at Camp Desert Rock. The interference ceased when the machine was shut off.

Five parties of Project 39.7 had the permission of the Test Director to enter Area 7-4 prior to R-hour and to go beyond the 10 r/hr line. One project of CETG and ORNL personnel also had permission from the Test Director to enter radiation fields above 10 r/hr to facilitate recovery of evaluation equipment. A monitor for one of the Project 39.7 parties reported a reading of 40 r/hr 125 yd southwest of Ground Zero. In announcing R-hour at 1118 hr, the Test Director also reopened recovery for Apple. When the check points were recalled at 1930 hr, after the forward areas were clear of working parties, 26 project parties had obtained entry to the Wasp' area and 25 project parties had entered the Apple area.

The following parties were briefed for entry into the Wasp' area: on 30 March, 73 parties; 31 March, 25 parties; 1 April, 21 parties; 2 April, 13 parties; 3 April, 3 parties; 4 April, 12 parties; 5 April, 5 parties; 6 April, 5 parties; 7 April, 4 parties; and 8 April, 6 parties.

Survey data are shown in Tables 3.29 to 3.31. Isointensity plots are shown in Figs. 3.52 to 3.54.

3.11 SHOT HA

Shot HA was an airdrop at 1000 hr, 6 April 1955. There were no Rad-Safe requirements other than briefing three parties for cannister recovery in the Test Site area.

3.12 SHOT POST

At 0430 hr, 9 April 1955, shot Post was detonated on a 300-ft tower in Area T-9c. Initial survey teams and check point personnel departed from the Rad-Safe Building at 0435 hr. The actual survey was conducted from 0455 through 0600 hr. A helicopter survey was not accomplished. The Test Director declared R-hour at 0615 hr.

Frequent intensity readings were furnished to the Test Director relative to the BJY and Area 7-1a, where a new tower was under construction. The reading at the BJY rose to 200 mr/hr and readings as high as 2 r/hr were reported in Area 7-1a. Construction work in the Area 7-1a was stopped from shot day until 11 April 1955, when the radiation level had dropped to 30 mr/hr.

The Plotting and Briefing Section briefed 10 parties for access to the Post area on shot day. The following parties were briefed for entry into the Post area: on 9 April, 10 parties; 10 April, 2 parties; 11 April, 9 parties; 12 April, 3 parties; 13 April, 10 parties; and 14 April, 4 parties.

Survey data are shown in Tables 3.32 and 3.33. Isointensity plots are shown in Figs. 3.55 to 3.59.

3.13 SHOT MET

Shot Met was detonated from a 400-ft tower in Frenchman Flat at 1115 hr, 15 April 1955, after a 2-hr 15-min delay caused by wind conditions.

For this shot a part of the Plotting and Briefing Section was established at the Frenchman Flat access road and Mercury highway to handle the heavy participation of military projects in the area. This section was in position and functioning at 1135 hr, at which time the Test Director opened Mercury highway to north- and south-bound traffic.

The initial survey party, in two groups, departed from the Ranger CP area to the south and the Rad-Safe Building to the north immediately after shot time. The actual survey began

(Text continues on page 133.)

Table 3.29—RESULTS OF SURVEYS, WASP'

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey, 29 March 1955			
114.0	10	1050	513.5	10	1030
110.0	100	1047	509.0	100	1034
106.6	1,000	1045	506.0	1,000	1036
103.1	10,000	1043	503.0	10,000	1038
213.8	10	1042	613.1	10	1033
209.9	100	1044	610.4	100	1035
206.0	1,000	1045	606.8	1,000	1037
202.5	10,000	1046	603.2	10,000	1040
314.0	10	1030	712.9	10	1100
309.5	100	1031	709.5	100	1104
306.0	1,000	1033	706.5	1,000	1107
303.2	10,000	1035	703.5	10,000	1110
422.0	10	1047	815.2	10	1035
410.5	100	1050	811.0	100	1039
406.0	1,000	1052	806.9	1,000	1040
402.0	10,000	1054	803.3	10,000	1042
		Resurvey 1, 30 March 1955			
110.9	10	0700	512.0	10	0650
108.2	100	0658	508.0	100	0652
105.0	1,000	0656	506.5	1,000	0654
102.0	10,000	0655	500.7	10,000	0656
211.5	10	0712	611.5	10	0646
207.5	100	0714	607.5	100	0649
203.0	1,000	0715	604.5	1,000	0652
201.2	10,000	0717	603.2	10,000	0655
312.3	10	0645	710.5	10	0721
308.1	100	0647	707.2	100	0724
304.5	1,000	0649	703.8	1,000	0726
301.2	10,000	0651	702.1	10,000	0728
414.5	10	0700	812.8	10	0647
408.0	100	0702	808.0	100	0650
405.5	1,000	0705	804.8	1,000	0651
400.5	10,000	0707	802.5	10,000	0654
		Resurvey 2, 1 April 1955			
107	10	1055	507	10	1005
104.2	100	1100	504	100	1008
103.4	1,000	1101	501	1,000	1010
207	10	0900	607.7	10	1020
204.5	100	0905	604.8	100	1025
201.2	1,000	0913	601.5	1,000	1029
GZ	2,000	0920	707.5	10	1035
307	10	0930	705	100	1040
304.5	100	0931	702.4	1,000	1042
301.8	1,000	0932	807	10	1045
408	10	0950	805	100	1047
404.3	100	0952	800.9	1,000	1050
402.8	1,000	0955			

Table 3.30—HELICOPTER DATA, WASP'

Location	Intensity (T1B), mr/hr	Probe intensity, mr/hr	Altitude above terrain, ft	Time	Computed ground reading,* mr/hr
Initial Survey, 29 March 1955					
Area 1	0	0	50	1020	
Z (12,200 ft az. 190° from T-9b)	40	0	15	1026	47
CB (9800 ft az. 49° from T-7-1a)	40	0	100	1032	80
S (14,000 ft az. 57.5° from T-3)	10	0	20	1037	12
CW (950 ft az. 270° from T-7-4)	14,000	35,000	500	1045	168,000

* Computed ground reading taken from "Correlation Curves for Air to Ground Readings," 3 April 1953, Operation Upshot-Knothole Rad-Safe Report WT-817, Chap. 14.

Table 3.31—MISCELLANEOUS READINGS, WASP'

Location	Intensity, mr/hr	Time
Initial Survey, 29 March 1955		
Y (10,550 ft az. 124° from T-2)	250	1115
T-9c tower	25	1156
O (3000 ft az. 180° from 7-1a)	10,000	1212
125 yd SW of GZ	40,000	1045
Stake 403	3,000	1130
BA (5500 ft az. 259° from T-10a)	Clear	1042
BI (12,500 ft az. 315.5° from T-3a)	Clear	1042

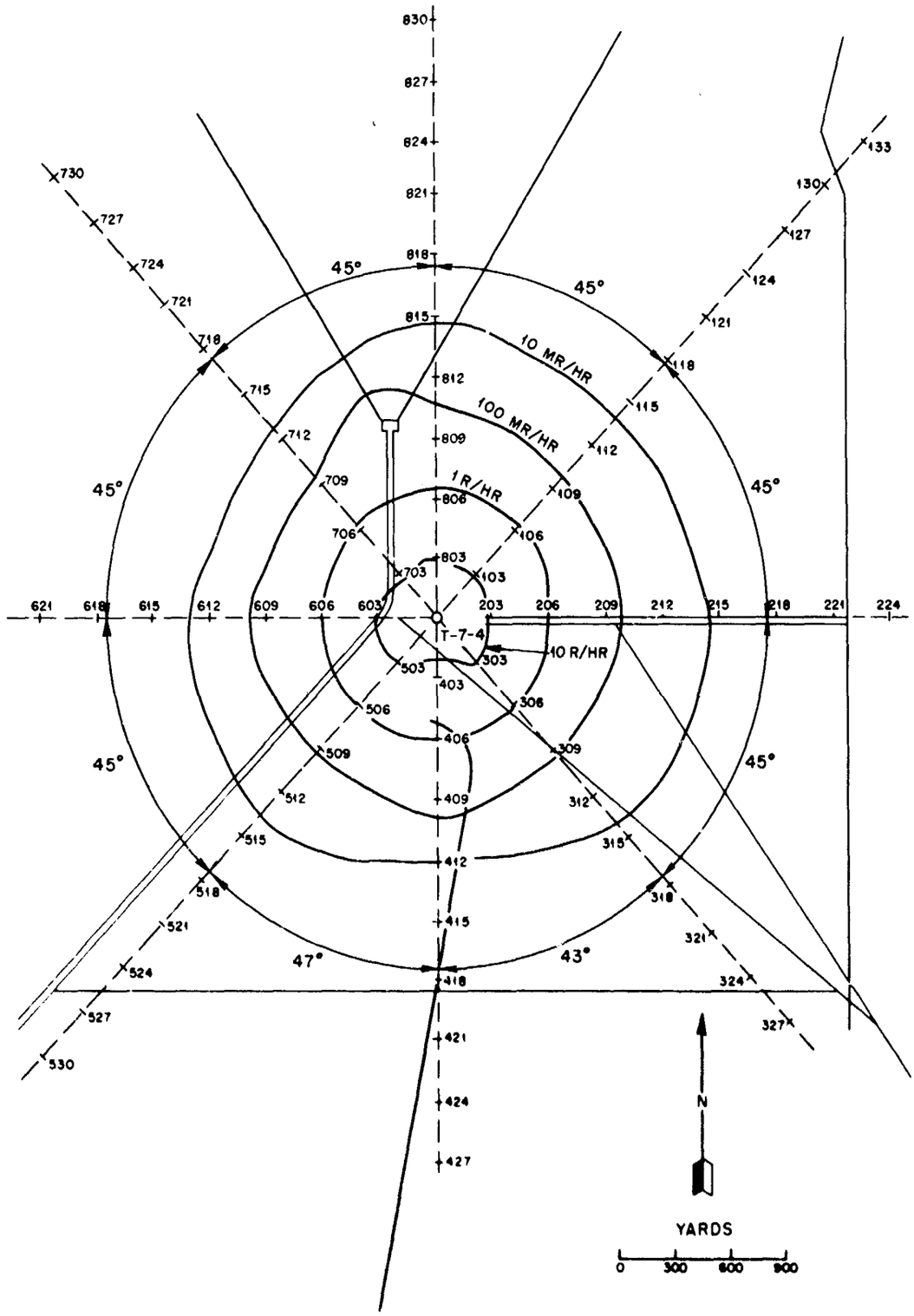


Fig. 3.52—Initial survey, Wasp', Area, T-7-4; date, 29 March 1955; survey time, 1033 to 1110 hr.

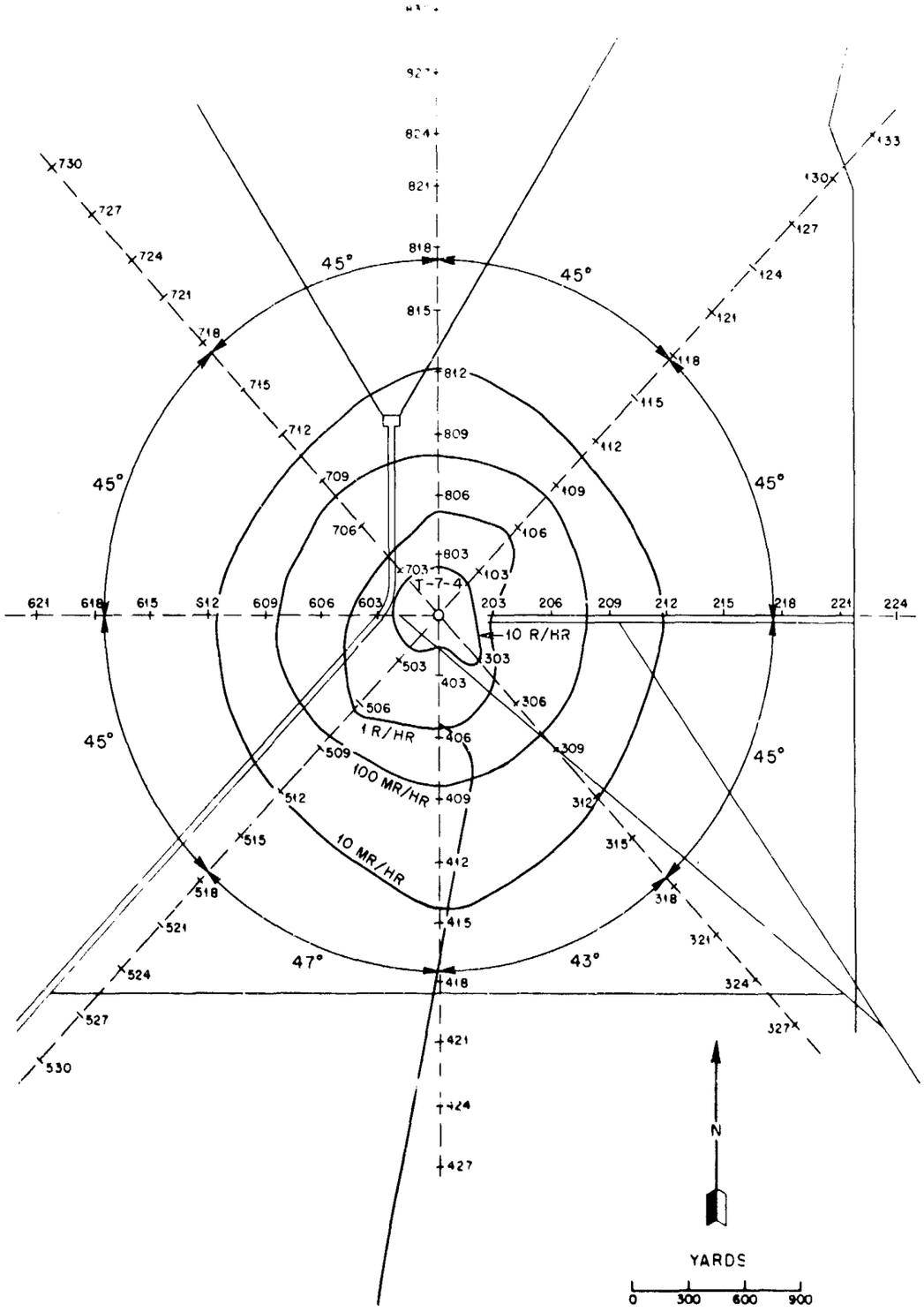


Fig. 3.53—Resurvey 1, Wasp'. Area, T-7-4; date, 30 March 1955; survey time, 0645 to 0728 hr.

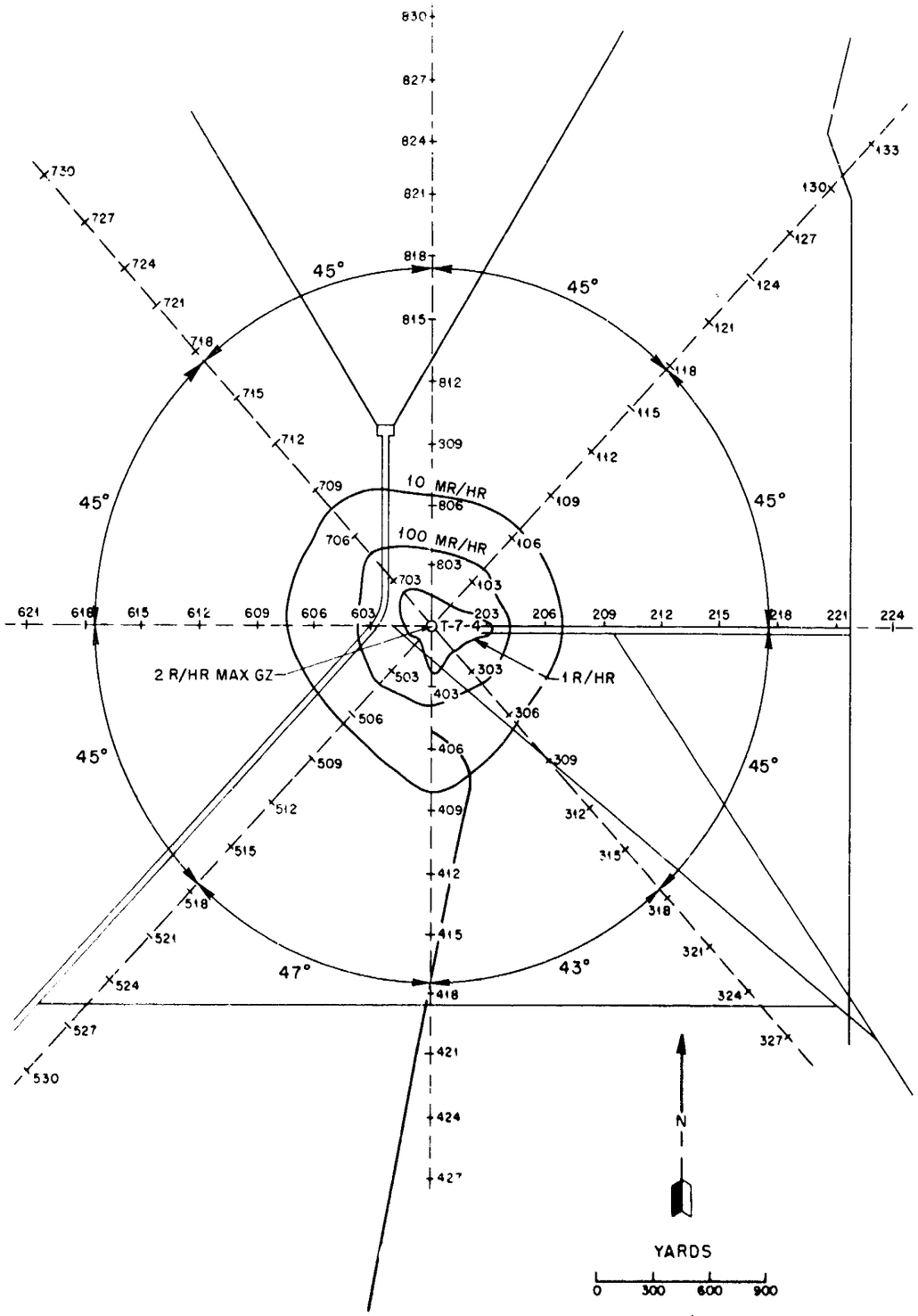


Fig. 3.54—Resurvey 2, Wasp', Area, T-7-4; date, 1 April 1955.

Table 3.32 — RESULTS OF SURVEYS, POST

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey, 9 April 1955			
717	10	0510	535.3	100	0515
713.5	100	0513	513	1,000	0525
712	1,000	0514	504.3	10,000	0534
705.8	10,000	0517	620	10	0543
806	10,000	0519	616	100	0545
810.5	1,000	0521	607	1,000	0555
812.6	100	0523	604.3	10,000	0557
821.5	10	0532	134	300	0618
225	100	0500	119	1,000	0625
217	1,000	0503	104.3	10,000	0630
208	10,000	0507	433	10,000	0507
544.8	10	0505	336	2,000	0547
536	50	0511	518 of 7-1a	100	0502
		Resurvey 1, 11 April 1955			
534.5 of T-7-1a	10	0615	716.5	10	0630
408	100	0635	713	100	0631
402.5	1,000	0638	711.5	20	0633
402	10,000	0640	704.5	100	0636
308	100	0645	703.5	1,000	0640
301	1,000	0648	700.5	10,000	0641
300.5	10,000	0650	803.5	1,000	0645
336	40	0705	804.5	100	0646
510	10	0630	809.5	10	0650
505.7	100	0633	T-7-4 GZ	30	0745
503.5	1,000	0637	H16 of T-3a	10	0755
500.7	10,000	0639	125	10	0615
600.7	10,000	0640	107	100	0621
603.2	1,000	0643	103.5	1,000	0623
606.5	100	0644	100.5	10,000	0625
612.0	100	0647	215	10	0631
616.0	100	0649	205.5	100	0637
619.6	10	0650	202.5	1,000	0639
T-9b GZ	1,500	0720	200.5	10,000	0641
T-9b max.	2,500				
		Resurvey 2, 12 April 1955			
336	20	0922	200.2	10,000	1050
346.5	11	0930	427	30	0905
304.5	100	0950	410	36	0912
302	1,000	0954	408	50	0913
301	10,000	0957	406	65	0916
101	10,000	0959	402.8	100	0918
101.7	1,000	1000	401.5	1,000	0921
104.2	100	1005	400.8	10,000	0922
116	10	1010	501	1,000	0923
228.7	20	1026	502.5	100	0924
218	10	1033	510.5	10	0928
220	11	1044	609.5	8	0940
204.3	100	1047	607.3	10	0941
202	1,000	1049	734 of T-7-1a	30	0942

Table 3.32 — (Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr hr	Time
		Resurvey 2, 12 April 1955			
602 of T-9b	100	0943	GZ T-9b	1,200	1015
600.8 of T-9b	1,000	0944	On highway N of AF:*		
600.3 of T-9b	10,000	0945	1.2 miles	10	1030
610	14	1001	1.3 miles	45	1031
612	100	1003	1.5 miles	10	1032
619.5	10	1005	Sta. 9-300	22	1034
GZ T-9c	>10,000	1020	222.5 of T-7-1a	10	1051
		Resurvey 3, 21 April 1955			
407	10	0921	303.3	10	0936
401	100	0922	302.5	100	0937
400.2	1,000	0923	503.3	10	0943
106	15	0929	501.5	100	0944
107.5	10	0928	603	10	0948
101.5	100	0930	602	100	0949
803.3	10	0955	GZ (ground)	1,000	0958
801.5	100	0957	GZ (steel)	2,200	0959
		Resurvey 4, 4 May 1955			
104.5	10	0935	702	10	0950
101	100	0936	700.6	100	0951
GZ	700	0937	202.5	10	0953
501	100	0940	202	100	0954
502	10	0941	602.5	10	0959
303	10	0943	801	100	1000
300.8	100	0944			

* AF, 7500 ft az. 179° from T-9b.

Table 3.33 — MISCELLANEOUS READINGS, POST

Location	Intensity, mr/hr	Time
Initial Survey, 9 April 1955		
BJ (5600 ft az. 158° from T-3a)	0	0500
BJ	100	0536
BJY	400	0519
BJY	200	
BJY	80	0900
BJY	48	1035
BJY	25	1300
BJY	0	1200
T-7-1a tower	2,000	0635
T-7-1a tower	1,000	0900
T-7-1a tower	400	1135
T-7-1a tower	250	1315
B (11,000 ft az. 90° from T-4)	10	0535
0.3 mile N of BJY toward B	100	0537
0.3 mile S of BJY on highway	100	0543
2.55 miles S of BJY on highway	10	0541
402 (stake)	10,000	0630
O (3000 ft az. 180° from T-7-1a)	1,000	0638
AF (7500 ft az. 179° from T-9b)	300	0558
N of BH (13,700 ft az. 35° from T-3a) toward CB (9800 ft az. 49° from T-7-1a):		
0.5 mile	350	0538
1.0 mile	800	0540
1.5 miles	1,600	0542
BH	100	0536
CB	150	0545
Resurvey 1, 11 April 1955		
South of CB on road to BH, 0.3 mile	10	0723
CB	6	0720
BH	16	0730
BG (10,400 ft az. 44° from T-3)	13	0733
0.4 mile S of BG	10	0736

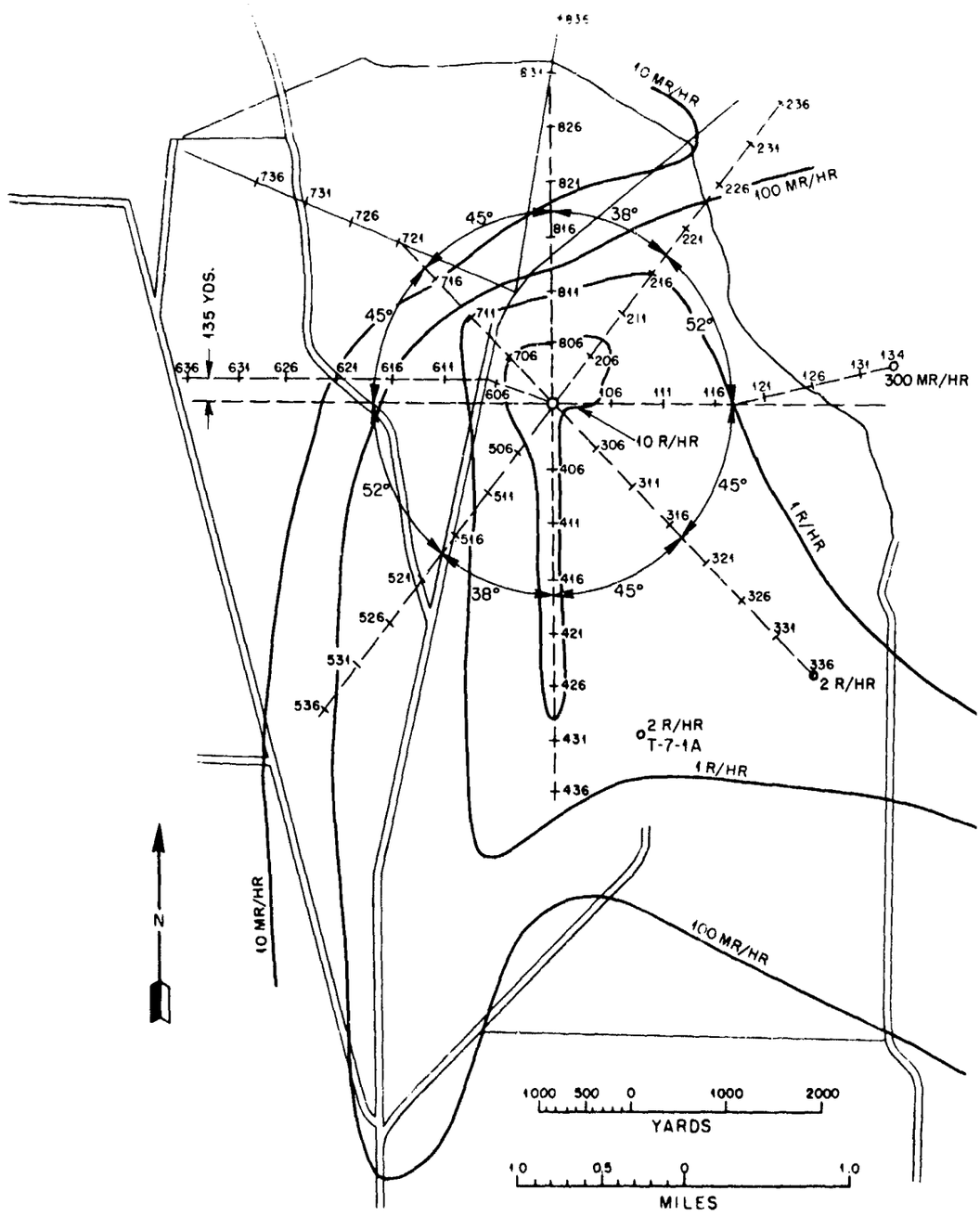


Fig. 3.55—Initial survey, Post. Area, T-9c; date, 9 April 1955; survey time, 0455 to 0600 hr.

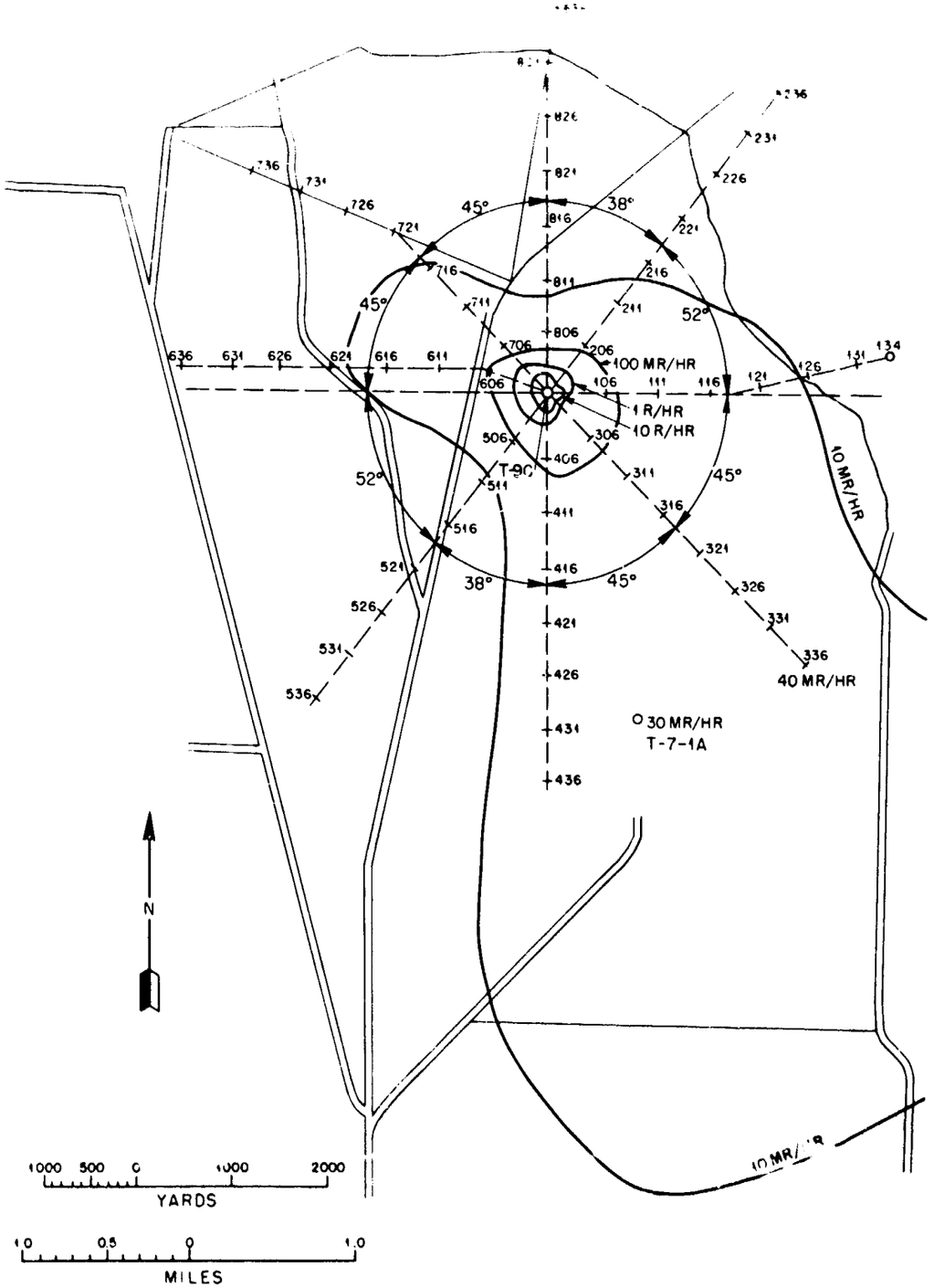


Fig. 3.56—Resurvey 1, Post. Area, T-9c; date, 11 April 1955; survey time, 0615 to 0650 hr.

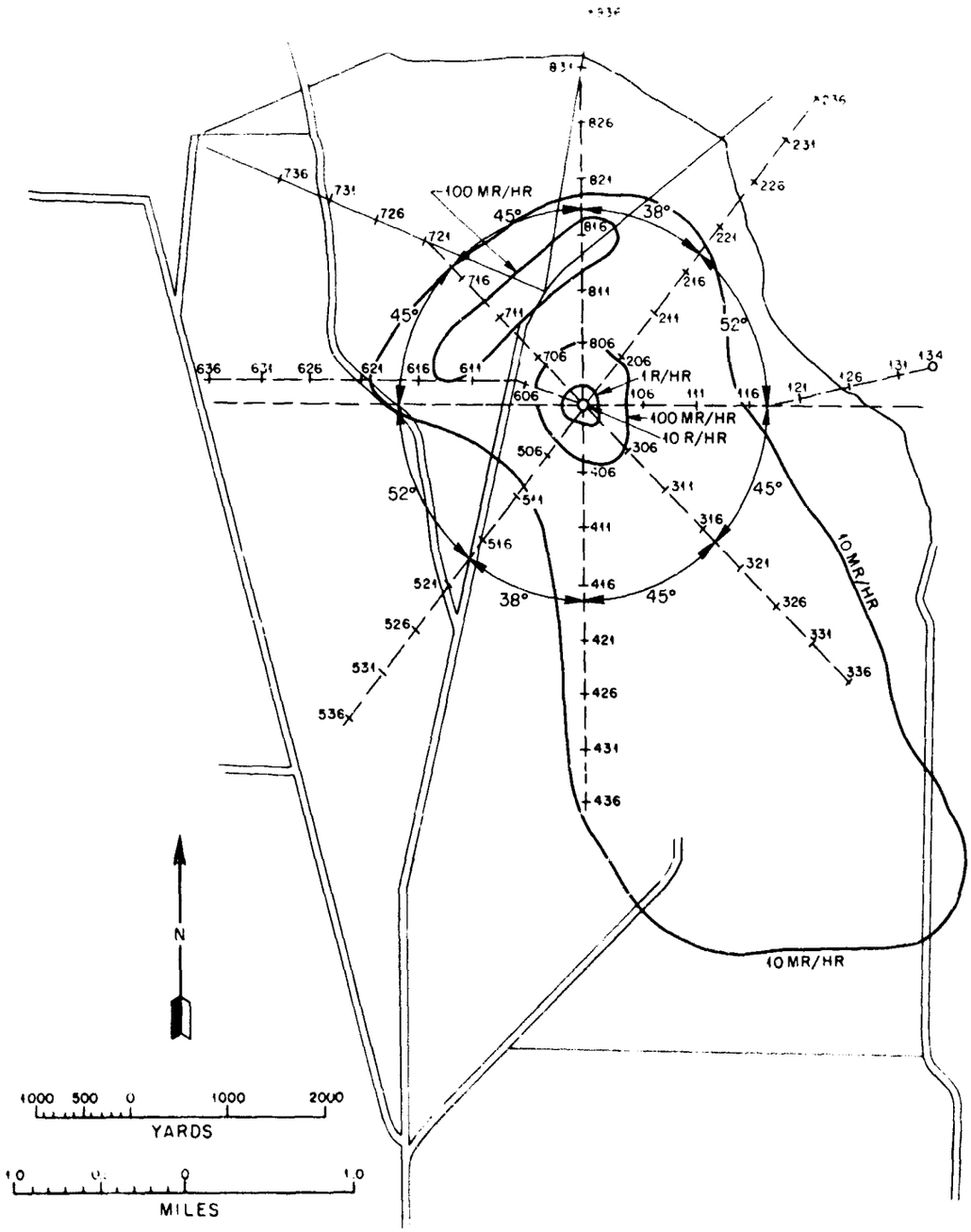


Fig. 3.57—Resurvey 2, Post. Area, T-9c; date, 12 April 1955; survey time, 0930 to 1050 hr.

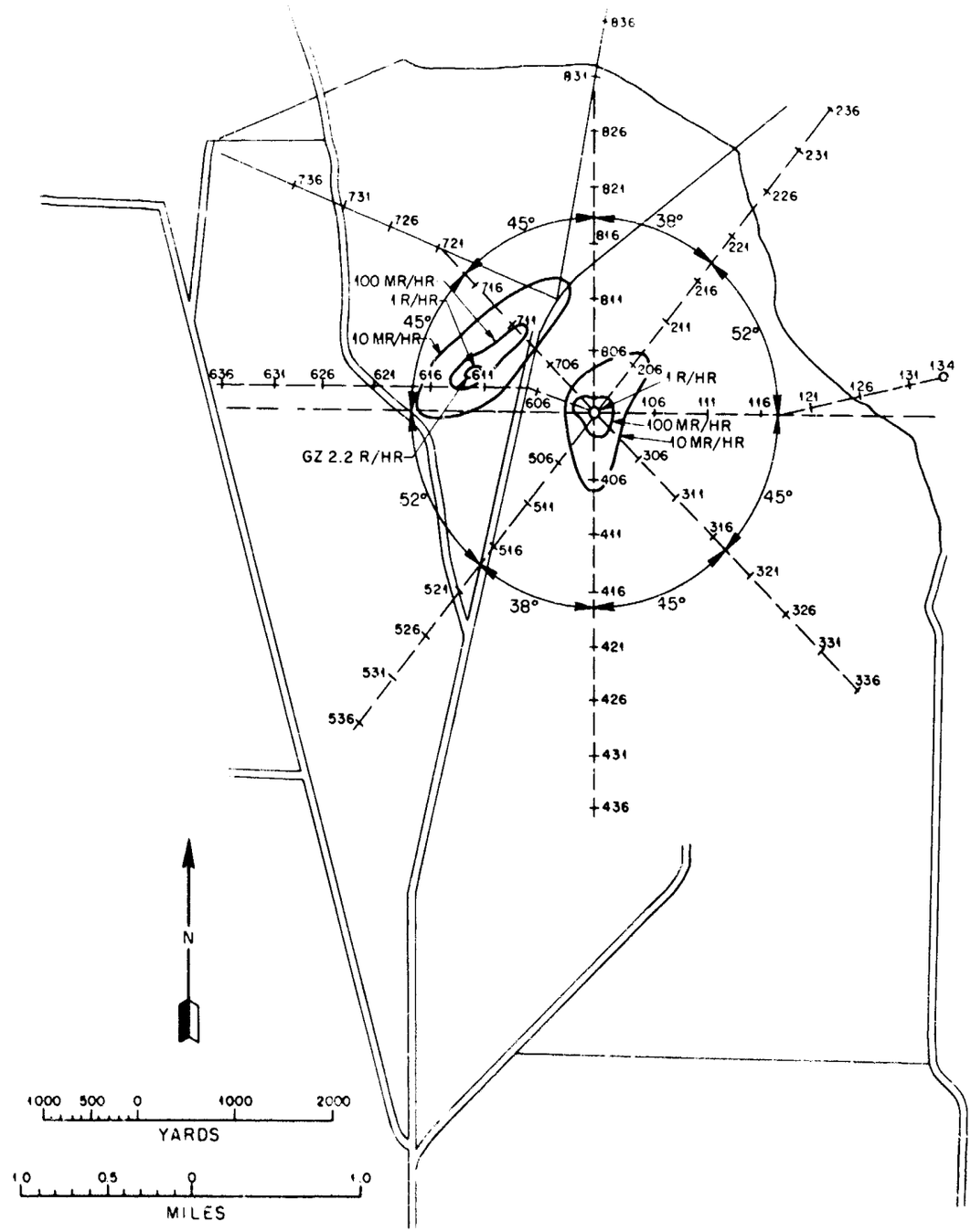


Fig. 3.58—Resurvey 3, Post, Area, T-9c; date, 21 April 1955; survey time, 0930 to 1050.

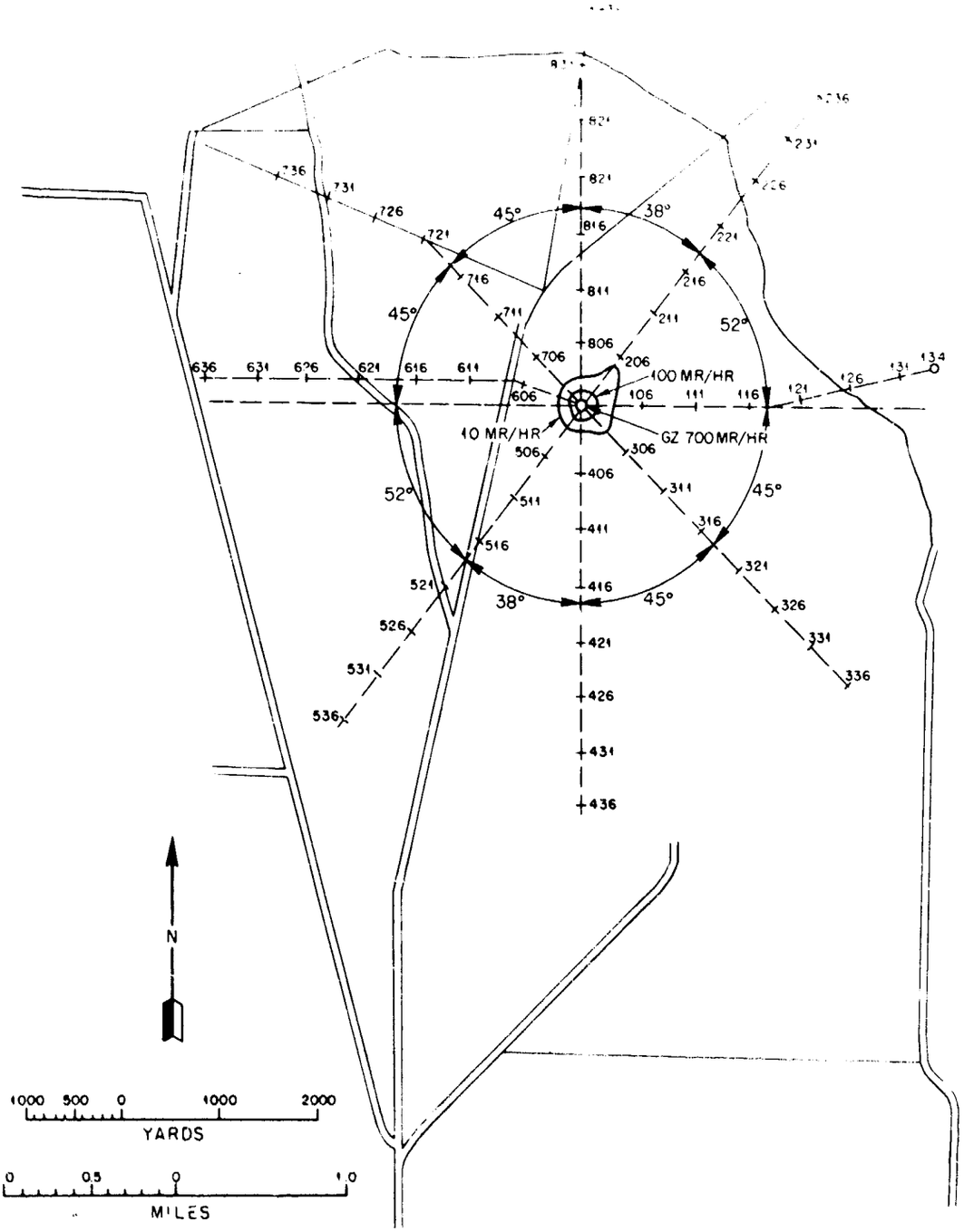


Fig. 3.59—Resurvey 4, Post. Area, T-9c; date 4 May 1955; survey time, 0935 to 1030 hr.

at 1150 hr and was completed, with the exception of a few readings, by 1240 hr. R-hour was declared by the Test Director at 1245 hr.

The separate Plotting and Briefing Section remained in operation at Mercury highway and the main access road to Frenchman Flat from shot day through 21 April 1955, after which time participation of recovery and evaluation parties became so light that it was not considered worth while to maintain a separate section. All parties after this date were processed from the Rad-Safe Building.

On shot day the Plotting and Briefing Section briefed 25 parties for entry into the Met area. The following parties were also briefed to enter the Met area: on 15 April, 25; on the 16th, 37; on the 17th, 22; on the 18th, 35; on the 19th, 35; on the 20th, 33; on the 21st, 17; on the 22nd, 5; on the 23rd, 2; on the 24th, 2; on the 25th, 5; on the 26th, 2; and on the 27th, 1. In addition to the above, a total of 29 parties were briefed for areas in Yucca Flat during this period.

Survey data are shown in Tables 3.34 to 3.36. Isointensity plots are shown in Figs. 3.60 to 3.64.

3.14 SHOT APPLE II

At 0510 hr, 5 May 1955, shot Apple II was detonated on a 500-ft tower in Area T-1 of Yucca Flat. The survey team was released from the assembly point at 0530 hr. The first readings were taken at 0550, and the survey was completed at 0659 hr. A helicopter survey, started at 0529 hr, was of no assistance since the probe was cut off by the power lines across Mercury highway at 0538 hr.

R-hour was declared by the Test Director at 0650 hr.

On shot day a total of 80 parties were briefed and cleared for entry into the Apple II area. The following parties were briefed for entry into the Apple II area: on 6 May, 48; on 7 May, 14; on 8 May, 6; and on 9 May, 25. Nine parties entered other areas during this period.

Survey data are shown in Tables 3.37 and 3.38. Isointensity plots are shown in Figs. 3.65 to 3.67.

3.15 SHOT ZUCCHINI

Shot Zucchini was detonated on a 500-ft tower in Area T-7-1a at 0500 hr, 15 May 1955. Initial survey teams, road patrols, and check point personnel were dispatched from the Rad-Safe Building at 0502 hr. Check points were in position at 0515 hr.

The road patrols found Mercury highway to be free of contamination. Initial survey teams began their survey at 0528 hr and completed it at 0612 hr. The Test Director requested that the Mercury area be monitored from 0630 to 0830 hr for evidence of fall-out contamination.

The Office of the Test Director declared R-hour at 0625 hr, and recovery parties began clearing through the Plotting and Briefing Section. Project 15.3 was released prior to R-hour, when it became evident that their recovery station was well outside the contaminated area.

Helicopters were not used for the initial survey but were on stand-by for project support. During the day, 10 projects were cleared for access to the Zucchini area for recovery work. Contamination was fairly heavy to the southeast since the 10 r/hr line extended beyond accessible terrain for accurate plotting. Check points were recalled at 1900 hr, when all project activity for the day ceased.

On 16 May seven projects were briefed for access to the Zucchini area.

Survey data are shown in Tables 3.39 and 3.40. Isointensity plots are shown in Figs. 3.68 and 3.69.

3.16 SUMMARY

During Operation Teapot the Plotting and Briefing Section briefed a total of 1165 parties for entry into contaminated areas. A total of 64 radiological-situation maps were prepared and distributed.

Table 3.34—RESULTS OF SURVEYS, MET

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey, 15 April 1955			
154.4	10	1217	517.0	10	1215
143.0	100	1210	512.0	100	1218
122.0	1,000	1229	508.0	1,000	1221
104.4	10,000	1234	504.5	10,000	1226
217.0	10	1300	617.5	10	1150
214.5	100	1301	612.2	100	1153
209.2	1,000	1304	608.5	1,000	1158
205.7	10,000	1305	603.2	10,000	1201
315.7	10	1235	716.2	10	1155
311.9	100	1225	712.5	100	1158
308.4	1,000	1226	709.0	1,000	1200
304.8	10,000	1229	705.5	10,000	1203
414.9	10	1205	817.5	10	1214
411.0	100	1207	813.5	100	1215
407.9	1,000	1209	811.0	700	1217
404.0	10,000	1213			
		Resurvey 1, 16 April 1955			
151.8	10	0537	402.2	10,000	0531
116.5	100	0550	513.5	10	0542
104.5	1,000	0600	507.5	100	0545
102.6	10,000	0605	506.2	1,000	0550
213.0	10	0607	502.7	10,000	0553
207.5	100	0609	613.0	10	0520
205.7	1,000	0611	609.0	100	0522
204.0	10,000	0612	606.2	1,000	0525
311.6	10	0539	604.5	10,000	0527
308.5	100	0540	713.0	10	0535
304.9	1,000	0542	709.0	100	0538
301.4	10,000	0545	707.2	1,000	0540
411.0	10	0528	703.7	5,000	0542
408.0	100	0529	813.4	10	0554
404.2	1,000	0530	810.5	100	0556
		Resurvey 2, 18 April 1955			
123.5	10	0641	304.8	100	0656
114.8	100	0651	302.2	1,000	0657
104.5	1,000	0659	301.2	10,000	0658
080.0	10,000	0700	408.0	10	0643
207.5	10	0705	404.9	100	0644
205.8	100	0707	402.2	1,000	0645
204.0	1,000	0708	401.3	10,000	0646
044.0	2,000	0710	510.0	10	0655
307.5	10	0654	506.2	100	0657

Table 3.34 — (Continued)

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Resurvey 2, 18 April 1955			
504.5	1,000	0659	709	10	0647
096.0	10,000	0701	705.5	100	0648
609.0	10	0635	703.7	1,000	0650
606.2	100	0657	702.0	3,200	0652
602.7	1,000	0640	811.0	10	0707
096.0	10,000	0642			
		Resurvey 3,* 20 April 1955			
808.5	10	1023	605.3	10	1020
805	100	1027	602.6	100	1021
803.2	1,000	1028	601.8	1,000	1022
108.9	10	1034	707	10	1025
103.5	100	1037	704.4	100	1026
101.7	1,000	1039	702.6	1,000	1027
208.5	10	1045	505.3	10	1031
206.7	100	1046	503.5	100	1032
205	1,000	1047	501.8	1,000	1033
305.7	10	1052	407	10	1041
302.2	100	1055	403.5	100	1042
300.5	1,000	1056	401.8	1,000	1043
GZ (ground)	18,000		GZ (steel)	20,000	
		Resurvey 4, 26 April 1955			
603.5	10	0910	300.1	1,000	0934
601.7	100	0911	204.5	10	0940
600.8	1,000	0912	201.7	100	0941
GZ (earth)	4,000	0913	200.1	1,000	0942
GZ (steel)	7,000	0914	107	10	0948
503.5	10	0918	105.3	100	0949
501.7	100	0919	103.5	1,000	0950
500.8	1,000	0920	803.5	1,000	0954
403.5	10	0926	806	100	0955
401.7	100	0927	809.5	10	0956
400.1	1,000	0928	703.5	10	1000
303.5	10	0932	701.7	100	1001
301.7	100	0933	700.5	1,000	1002

* 0.7 mile east of EB (7925 ft az. 343° from tower-F. Flat) read 10 mr/hr at 1015. South of this point was spotted with pockets with readings as high as 50 mr/hr.

Table 3.35—HELICOPTER DATA, MET

Location	Intensity (T1B), mr/hr	Probe intensity, mr/hr	Altitude above terrain, ft	Time	Computed ground reading,* mr/hr
Initial Survey, 15 April 1955					
EP (4.55 miles az. 277° from tower-F. Flat)	0	15	500	1135	0
EF (12,000 ft az. 276° from tower-F. Flat)	0	1	500	1141	0
ER (7150 ft az. 90° from tower-F. Flat)	0.4	1	500	1147	4.8
ES (2450 ft az. 296° from tower-F. Flat)	800	1000	500	1154	7600
ET (3000 ft az. 330° from tower-F. Flat)	750	1000	500	1200	9000

* Computed ground reading taken from "Correlation Curves for Air to Ground Readings," 3 April 1953, Operation Upshot-Knothole Rad-Safe Report WT-817, Chap. 14.

Table 3.36—MISCELLANEOUS READINGS, MET

Location	Intensity, mr/hr	Time
Initial Survey, 15 April 1955		
ED (7800 yd az. 277° from tower-F. Flat)	0	
EF (3850 yd az. 275° from tower-F. Flat)	0	
ER (2000 yd az. 268° from tower-F. Flat)	0.4	1147
ES (900 yd az. 289° from tower-F. Flat)	800	1154
ET (750 yd az. 342° from tower-F. Flat)	750	1200
EK (2000 yd az. 176° from tower-F. Flat)	0	
Resurvey 1, 16 April 1955		
EC (3000 yd az. 55° from tower-F. Flat)	100	0519
3520 yd E of EB* on road to EC	100	0739
3960 yd E of EB on road to EC	10	0743
Resurvey 2, 18 April 1955		
3068 yd from EB toward EC	36	0730
2112 yd from EB toward EC	10	0727
EC (3000 yd az. 55° from tower-F. Flat)	20	0735
EC + 352 yd E	10	0740

* EB, 2600 yd az. 341° from tower-F. Flat.

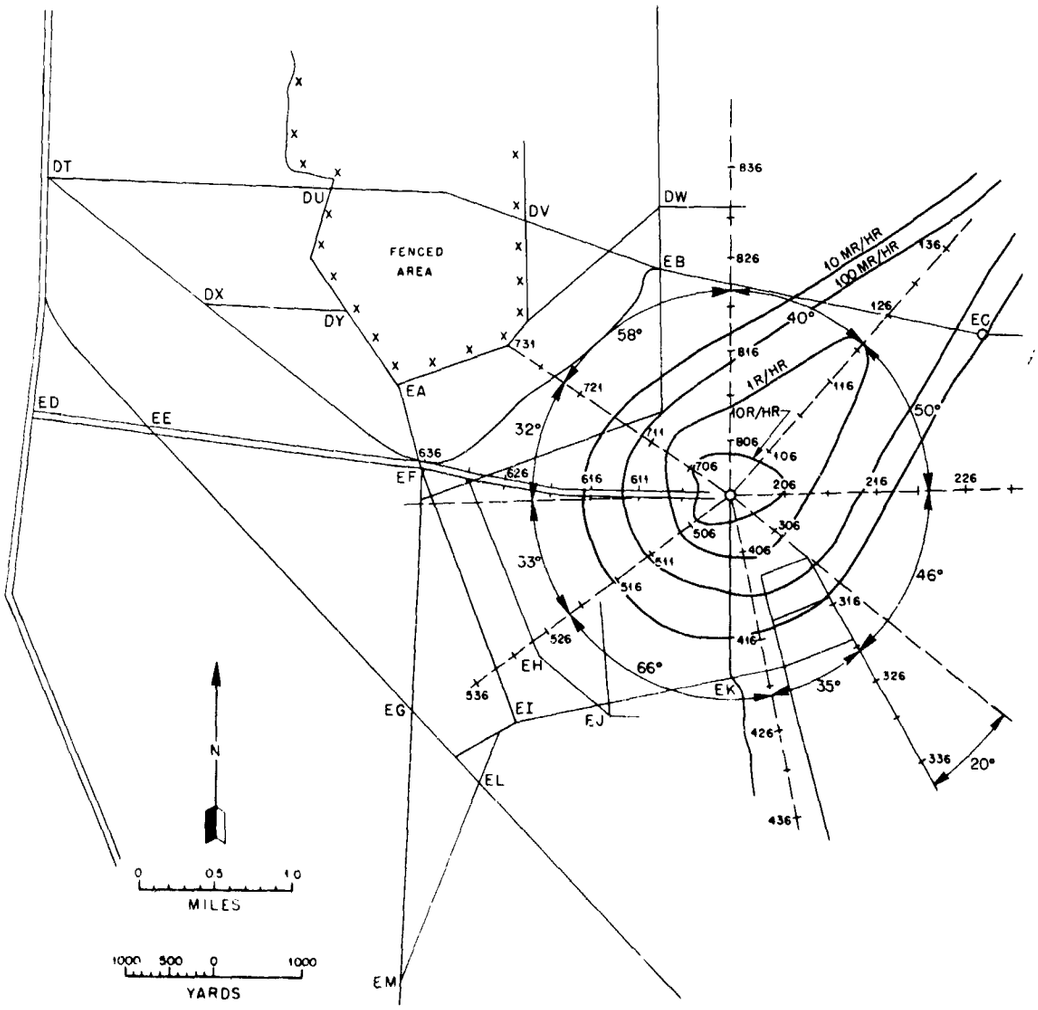


Fig. 3.60 — Initial survey, Met. Area, F; date, 15 April 1955; survey time, 1150 to 1305 hr.

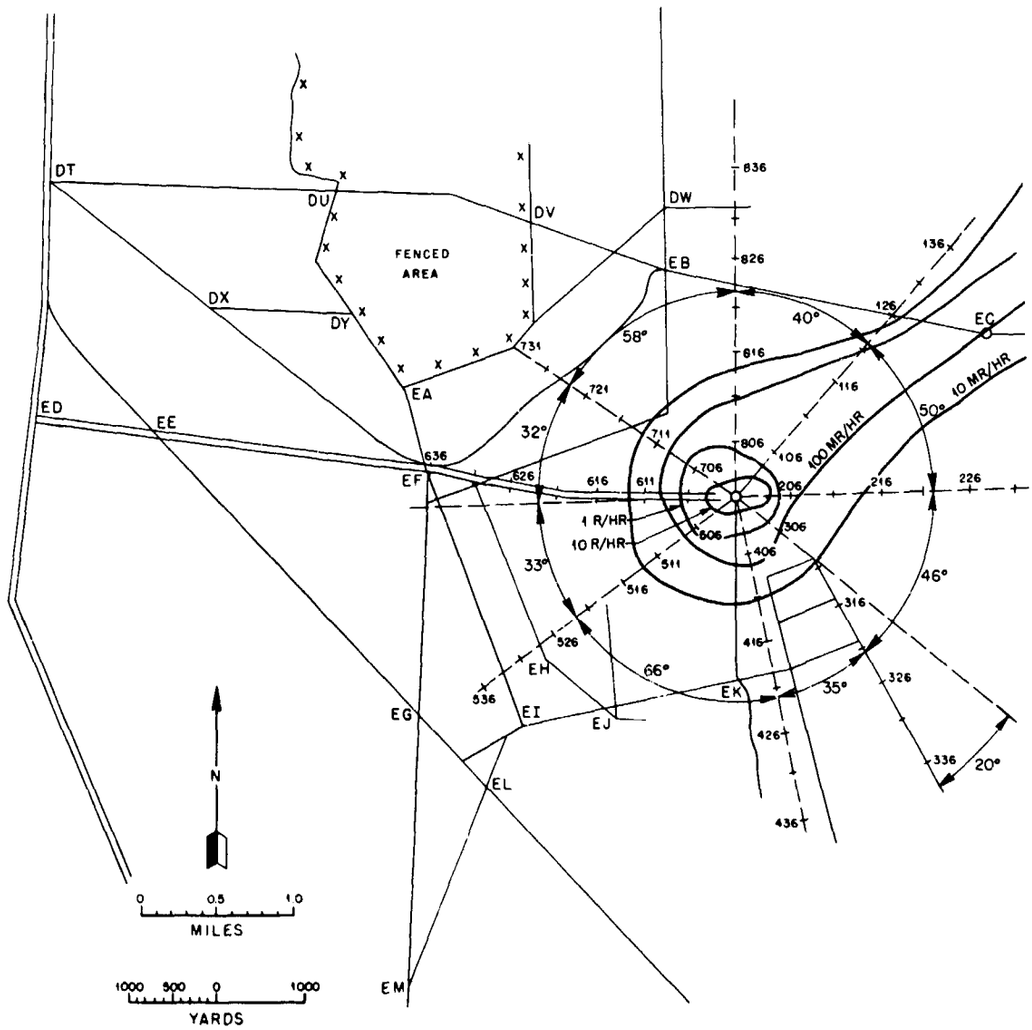


Fig. 3.61 — Resurvey 1, Met. Area, F; date, 16 April 1955; survey time, 0520 to 0615 hr.

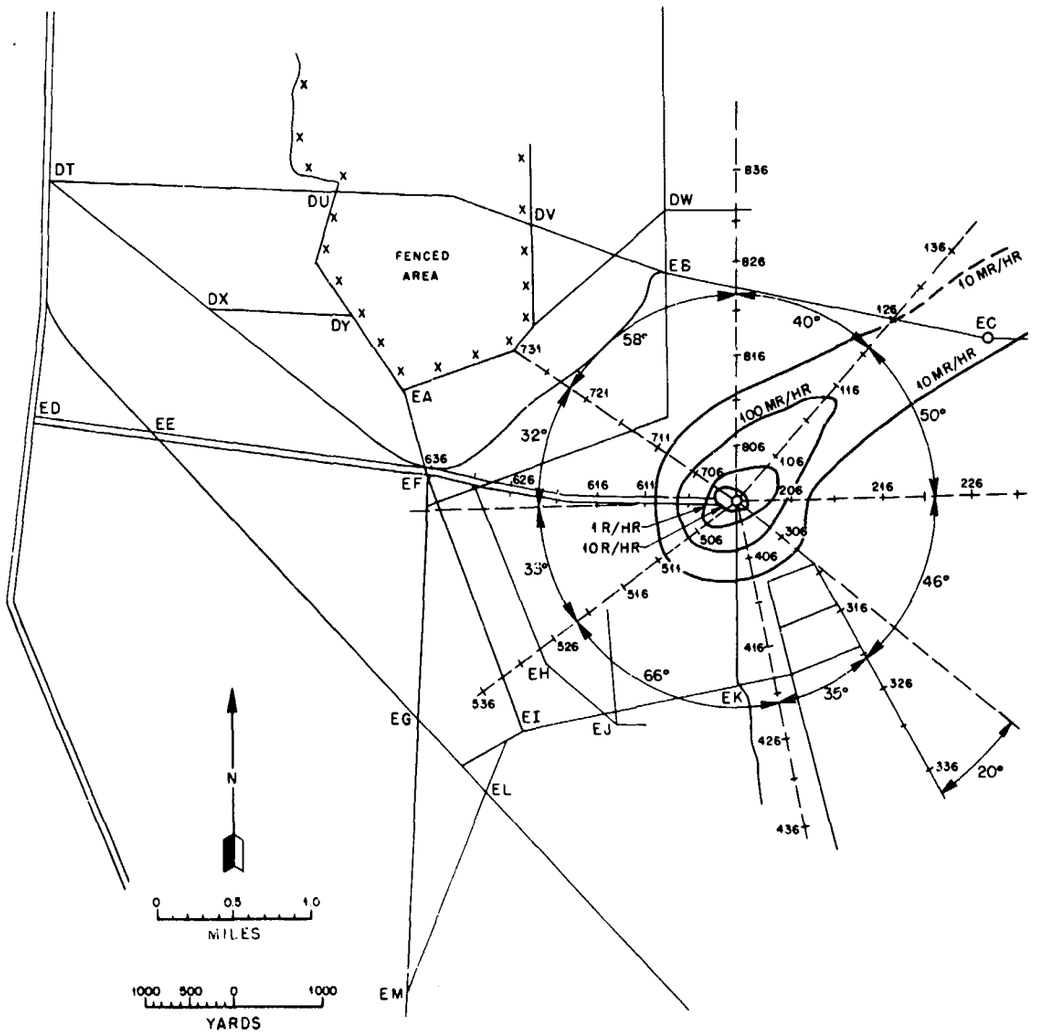


Fig. 3.62—Resurvey 2, Met. Area, F; date, 18 April 1955; survey time, 0635 to 0745 hr.

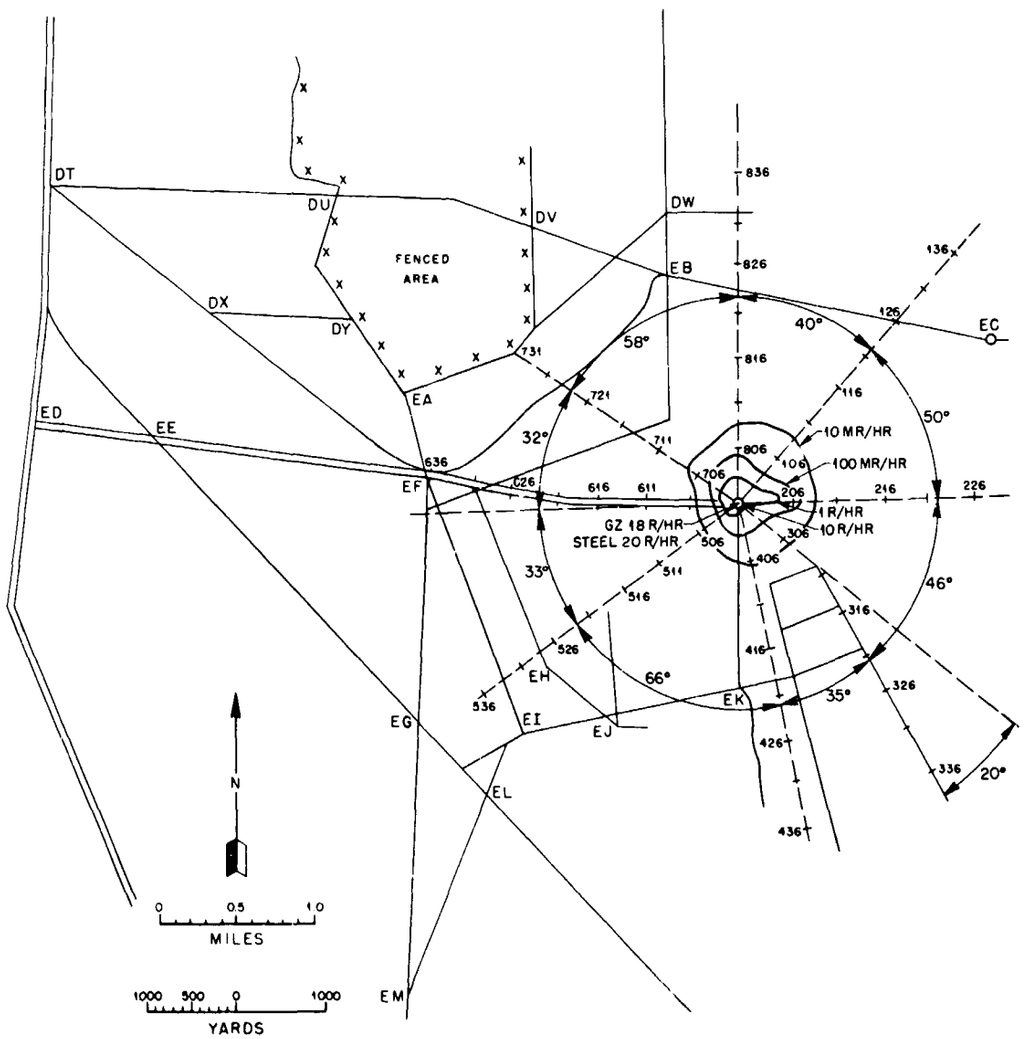


Fig. 3.63—Resurvey 3, Met. Area, F; date, 20 April 1955; survey time, 1015 to 1056 hr.

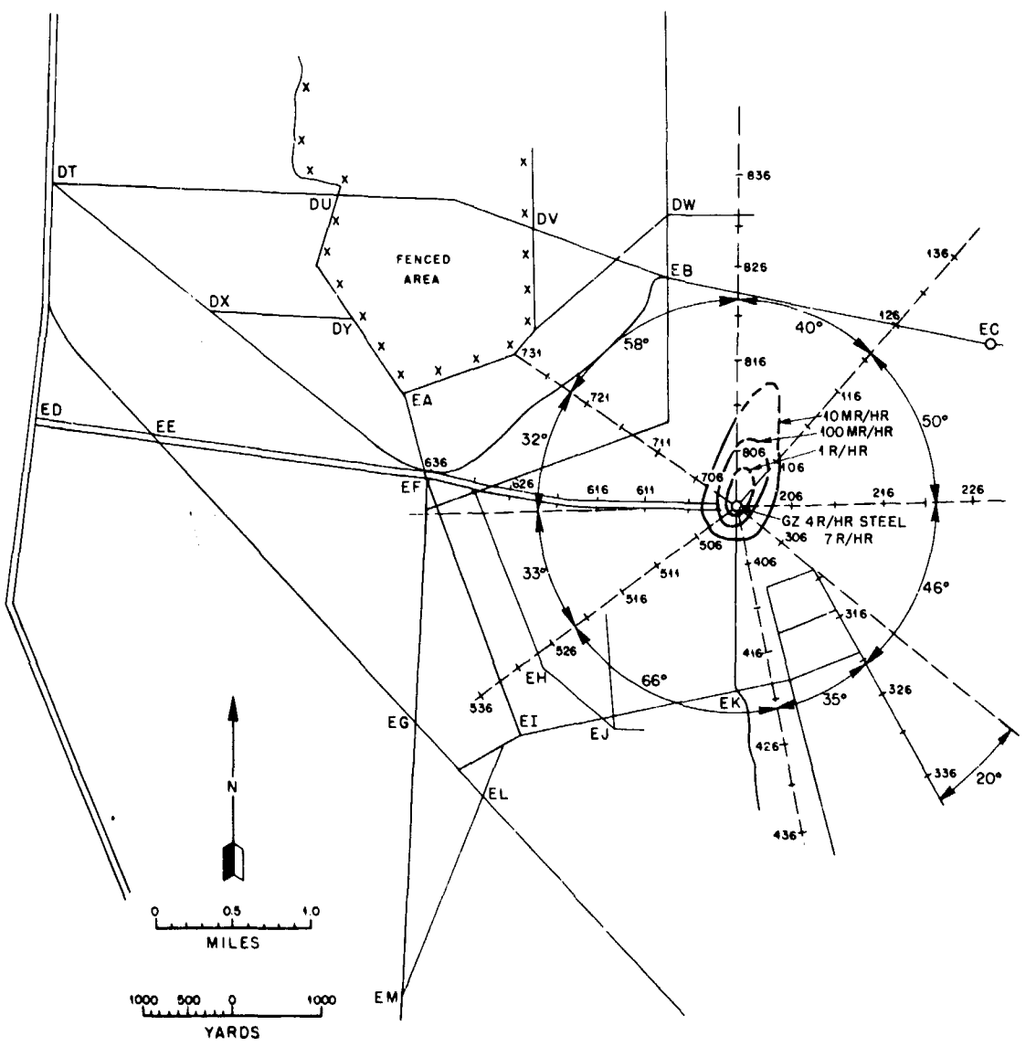


Fig. 3.64—Resurvey 4, Met. Area, F; date, 26 April 1955; survey time, 0910 to 0935 hr.

Table 3.37—RESULTS OF SURVEYS, APPLE II

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
		Initial Survey, 5 May 1955			
116.9	10	0550	432	10	0555
112.2	100	0554	415.7	100	0602
108.3	1,000	0557	409.3	1,000	0607
104.7	10,000	0600	405	10,000	0608
215.7	10	0614	318.9	10	0620
211	100	0615	312.9	100	0622
207.5	1,000	0617	305.8	1,000	0625
202.2	10,000	0619	304	10,000	0629
506	40	0601	423 (Area 4)	10	0601
510	10	0602	814.5	100	0610
520	10	0604	812.3	1,000	0613
525.5	100	0605	810.6	10,000	0615
530	1,000	0606	705.7	10,000	0647
630	10	0615	723	9,000	0650
623	100	0620	727	10,000	0657
617	1,000	0630	730	22,000	0659
608.5	10,000				
		Resurvey 1, 6 May 1955			
531	10	0632	112.5	10	0640
619	10	0635	108.3	100	0643
612.5	100	0640	106.5	1,000	0645
606.3	1,000	0640	104	10,000	0648
603.2	10,000	0647	212.3	10	0654
0.5 mile N of 612	600	0655	210.3	100	0700
5.7	10	0750	205.8	1,000	0702
521.9	100	0754	204	10,000	0704
714	1,000	0825	414.4	10	0632
814	10	0643	410	100	0635
810.3	100	0645	408.5	1,000	0639
806.8	1,000	0647	405	10,000	0642
804	10,000	0648	313.9	10	0658
534	2,600	0718	307.5	100	0700
727	1,000	0721	304	1,000	0702
707	10,000	0731	302.8	10,000	0705
		Resurvey 2, 9 May 1955			
204.3	10	1030	603.5	10,000	1053
201.7	100	1032	736	120	1059
201	1,000	1034	723	100	1100
200.1	10,000	1036	724	12	1104
301.7	1,000	1038	705.3	100	1110
303.5	100	1040	703.5	1,000	1111
307	10	1042	701.7	10,000	1112
406.1	10	1043	803.5	1,000	1115
403.5	100	1044	805.3	100	1116
401.7	1,000	1046	808.8	10	1117
615.8	10	1050	105.3	10	1118
307	100	1051	103.5	1,000	1119
606.2	1,000	1052	101.7	1,000	1120

Table 3.38—MISCELLANEOUS READINGS, APPLE II

Location	Intensity, mr/hr	Time
Initial Survey, 5 May 1955		
B (11,000 ft az. 90° from T-4)	0	0545
0.2 mile W of 823	10	0628
0.3 mile W of 823	100	0630
0.4 mile W of 823	1,000	0632
FD (8900 ft az. 336° from T-1)	1,000	0635
Sta. 34.3b-2 (1050 ft az. 150° from T-1):		
20 ft W	28,000	0820
260 ft W	60,000	0820
20 ft W	22,000	0940
260 ft W	40,000	0940
10 ft N	50,000	0940
240 ft W	22,000	1720
Pad	12,000	1720
BU (11,700 ft az. 231° from T-4)	9,000	0835
FB (7800 ft az. 272° from T-1)	60	0805
CA (13,000 ft az. 290° from T-1):		
0.2 mile N	10	0830
0.45 mile N	100	0832
0.55 mile N	1,000	0835
Resurvey 1, 6 May 1955		
BU (11,700 ft az. 231° from T-4)	600	0745
0.3 mile N of CA (13,000 ft az. 290° from T-1)	10	0740
0.6 mile N of CA (13,000 ft az. 290° from T-1)	100	0743
FD (8900 ft az. 336° from T-1)	100	0710
0.4 mile W of FD	1,000	0711

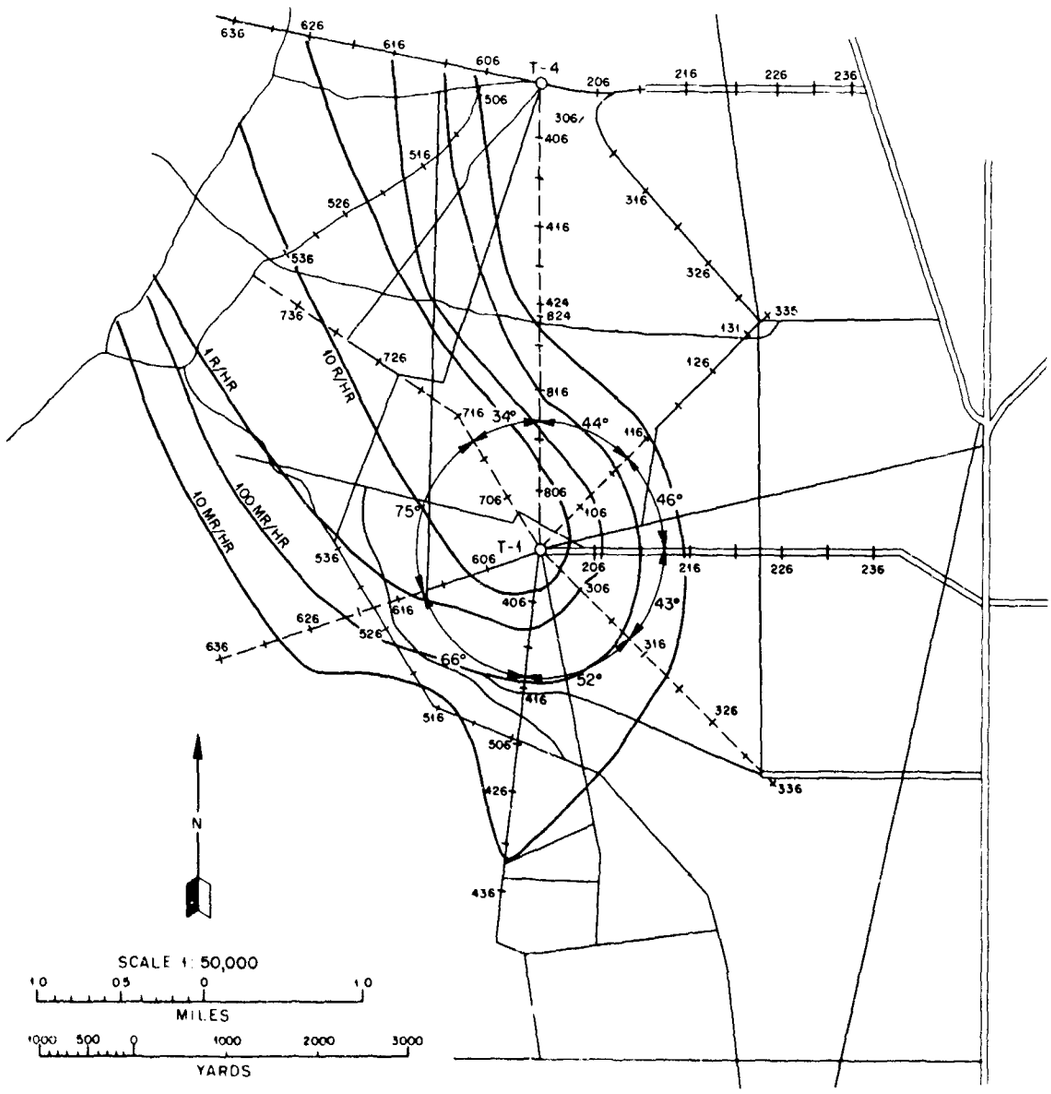


Fig. 3.65 — Initial survey, Apple II. Area, T-1; date, 5 May 1955; survey time, 0550 to 0659 hr.

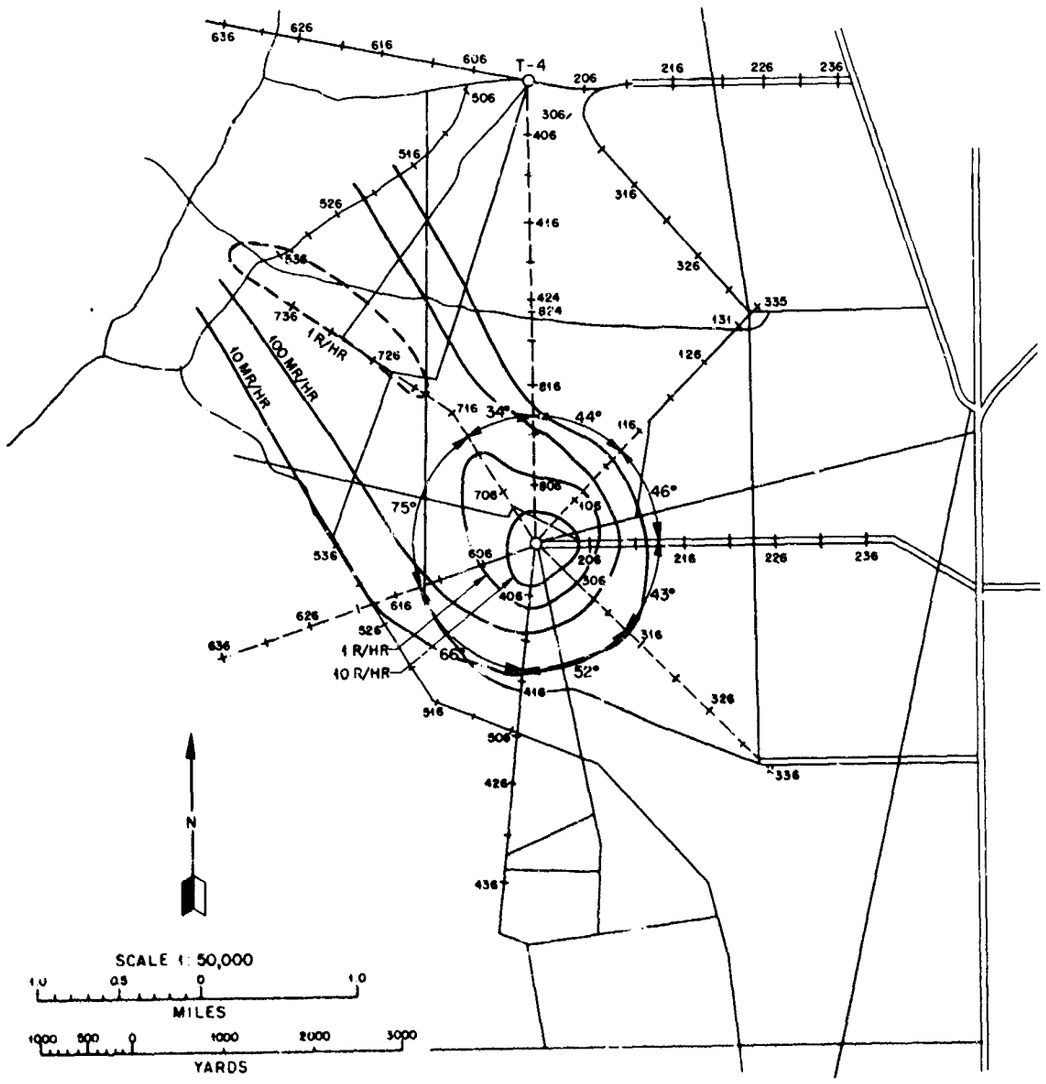


Fig. 3.66 — Resurvey 1, Apple II. Area, T-1; date, 6 May 1955; survey time, 0632 to 0731 hr.

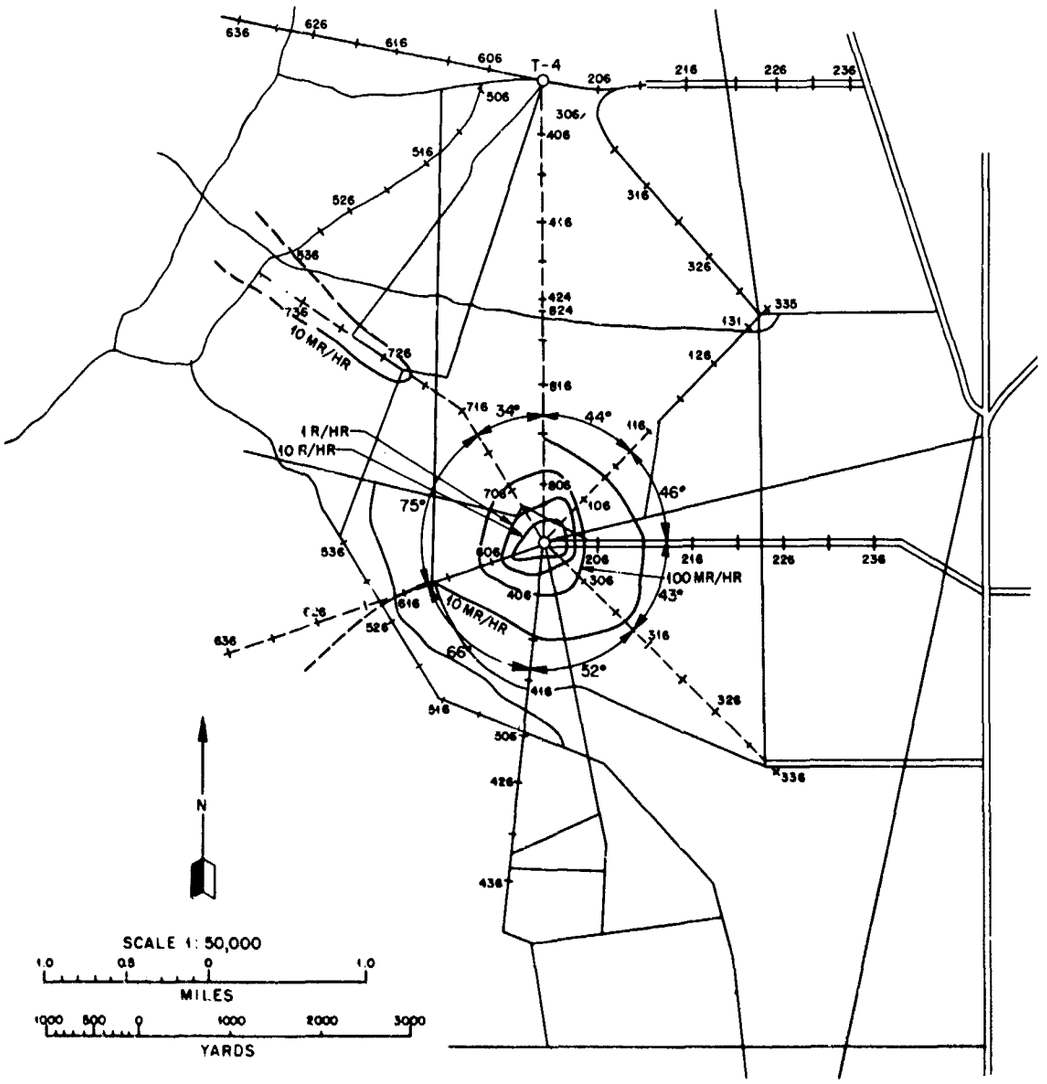


Fig. 3.67 — Resurvey 2, Apple II. Area, T-1; date, 9 May 1955; survey time, 1030 to 1120 hr.

Table 3.39—RESULTS OF SURVEYS, ZUCCHINI

Stake line location	Intensity, mr/hr	Time	Stake line location	Intensity, mr/hr	Time
Initial Survey, 15 May 1955					
118	10	0532	508.3	1,000	0535
113	100	0533	505.5	10,000	0540
109.5	1,000	0534	617	10	0603
106	10,000	0536	613	100	0605
217	10	0543	609.3	1,000	0609
213.9	100	0544	605.7	10,000	0612
208.5	1,000	0545	719	10	0533
205	10,000	0547	715.5	100	0534
419	10	0535	711	1,000	0538
414.5	100	0538	708.3	10,000	0540
407.5	1,000	0540	829.5	10	0553
403	10,000	0545	823.3	100	0553
517.5	10	0528	819.5	1,000	0600
512.7	100	0531	816.7	10,000	0604
Resurvey 1, 16 May 1955					
114.5	10	0835	715	10	0830
110.5	100	0836	711.2	100	0831
104.2	1,000	0837	706.5	1,000	0835
102.4	10,000	0838	704.7	10,000	0836
213	10	0841	826.5	10	0845
208.5	100	0845	822.3	100	0847
205	1,000	0847	815.7	1,000	0850
202	10,000	0849	817	10,000	0852
513.7	10	0832	333	10	0845
509.2	100	0836	313.7	100	0847
506.5	1,000	0839	306	1,000	0900
503	10,000	0841	303.3	10,000	0901
614	10	0857	413	10	0902
610	100	0900	409.5	100	0916
606.5	1,000	0903	406	1,000	0918
604	10,000	0906	402.5	10,000	0920

Table 3.40—MISCELLANEOUS READINGS, ZUCCHINI

Location	Intensity, mr/hr	Time
Initial Survey, 5 May 1955		
Sta. 7-300	460	0624
On road S of stake 224, 0.8 mile	10	0640
On road S of stake 224, 1.0 mile	100	0642
On road S of stake 224, 1.45 miles	1,000	0645
On road S of stake 224, 1.50 miles	10,000	0647
On road E of stake 830, 0.3 mile	10	0610
On road E of stake 830, 0.5 mile	100	0612
On road E of stake 830, 0.7 mile	1,000	0613
On road E of stake 830, 0.85 mile	10,000	0615
Resurvey 1, 6 May 1955		
Stake line 124 of T-3	10	0835
Stake line 255.7 of T-3	100	0837
Stake line 129.3 of T-3	1,000	0839
Stake line 135 of T-3	1,000	0841

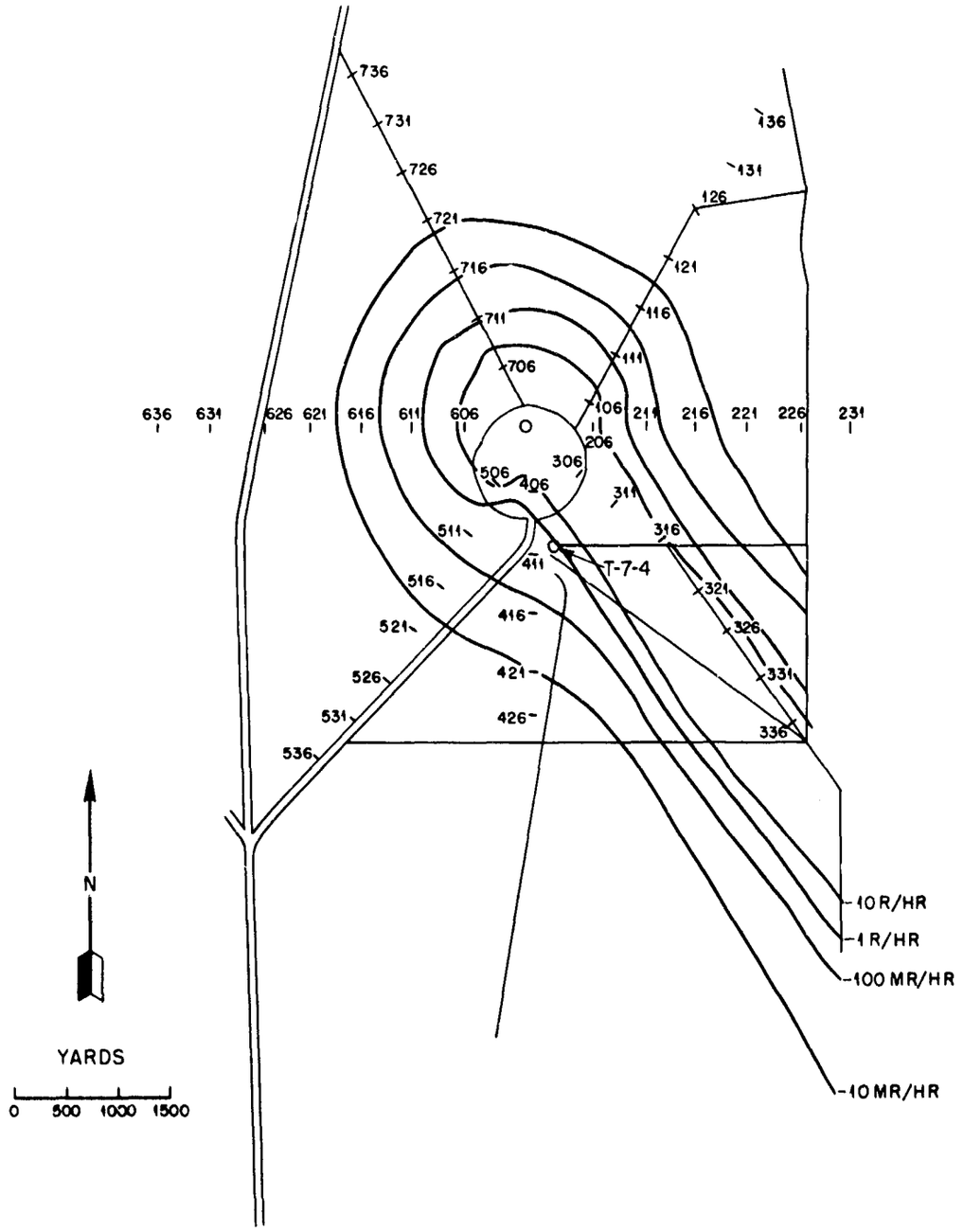


Fig. 3.68—Initial survey, Zucchini, Area, T-7-1a; date, 15 May 1955; survey time, 0528 to 0617 hr.

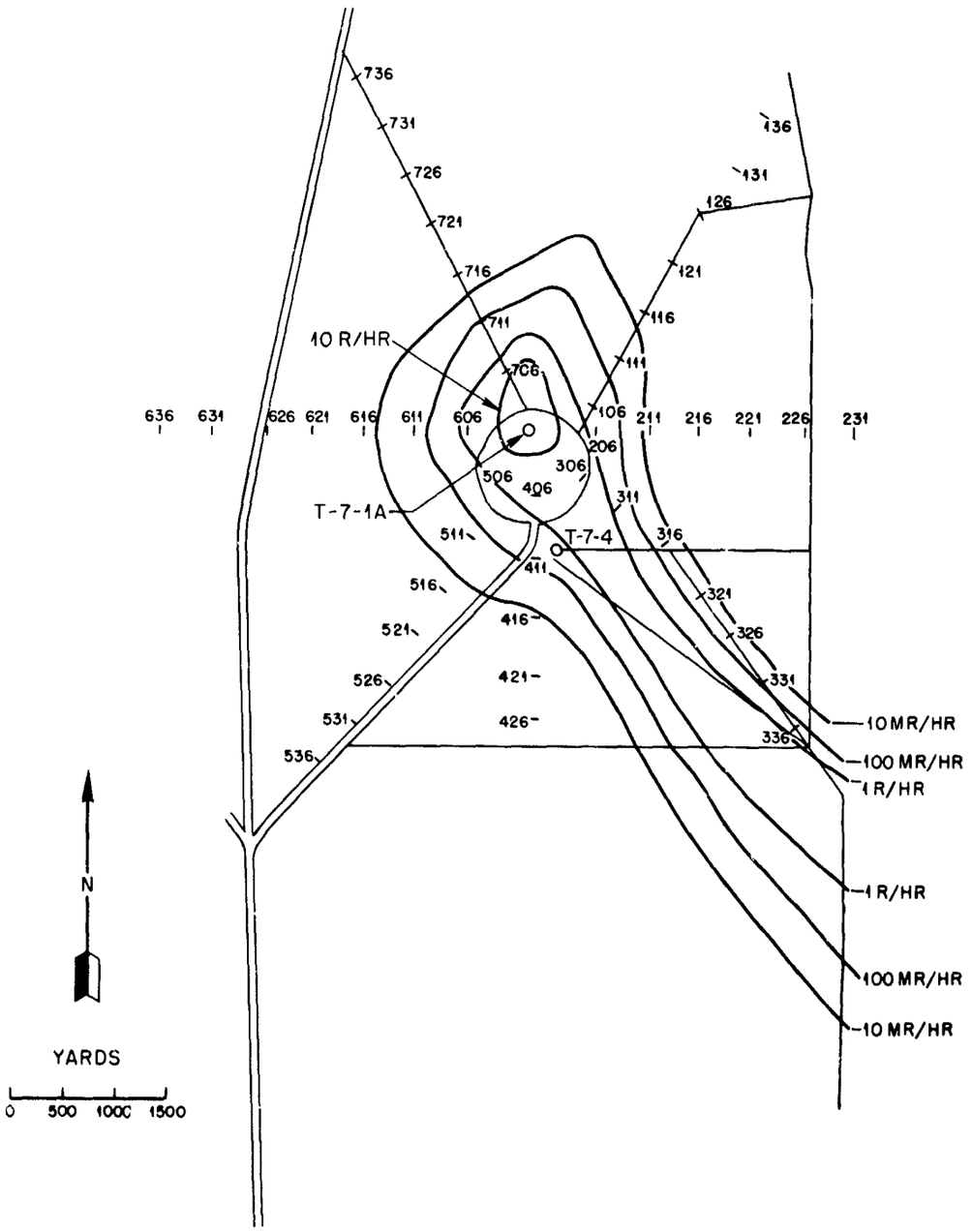


Fig. 3.69—Resurvey 1, Zucchini. Area, T-7-1a; date, 16 May 1955; survey time, 0832 to 0922 hr.

CHAPTER 4

MONITORING SECTION

4.1 INTRODUCTION

The mission of the Monitoring Section was to provide Rad-Safe monitoring support for Operation Teapot. The main functions of this section were:

1. To perform initial and resurveys for all nuclear shots.
2. To establish and operate main and area check point teams.
3. To survey main highways of the test site by means of road patrols.
4. To provide the Plotting and Briefing Section with accurate data of contaminated areas by surveys.
5. To provide qualified Rad-Safe monitors for all test personnel.
6. To mark off contaminated areas by appropriate signs.

The Monitoring Section was composed of 5 officers and 22 enlisted men from the 1st Rad-Safe Support Unit and 2 officers from the Chemical Corps School on TDY with the Unit. Two of the Unit Officers were released early owing to a Department of the Army Order. Augmentation personnel were furnished by the Air Force and Sandia Base on a rotational basis as follows:

Period of Duty	Home Unit	Officer	Enlisted
4 Feb. – 16 Mar.	9th Air Force	3	7
4 Feb. – 6 Mar.	Air Matériel Command	3	17
6 Mar. – 9 Apr.	Air Matériel Command	2	15
15 Mar. – 9 Apr.	9th Air Force	4	7
1 Mar. – 20 Mar.	Sandia Base	1	2
9 Apr. – 9 May	Air Matériel Command	5	15

In addition, all personnel of the Rad-Safe Group were trained as monitors and were utilized by the Monitoring Section as dictated by exposures of the section's personnel. Capt T. C. Aldridge, from the Army Chemical Center, Md., was in charge of this section.

The initial survey party generally consisted of one officer, one driver, and four or five 2-party survey teams. Four-wheel ¾-ton military vehicles, equipped with radio communication to the Plotting and Briefing Office, were used by these teams. The surveys of the shot areas were made by using eight rows of numbered stakes in each shot area radiating out from Ground Zero, separated by an angle of approximately 45°. In areas where roads ran near the survey lines, the stake lines followed the roads, making it easier for initial survey teams to cover the area rapidly, thus reducing dosage and eliminating time-consuming cross country driving. The stakes were placed at 100-yd intervals. The beginning and ending of each line were dependent

upon the spread of contamination estimated by the On-site Rad-Safe Officer. The numbering system and details for the stake lines are described in Chap. 3, Sec. 3.1. In addition to the numbered stakes, other easily identified ground points were located in the area and were given a code designation for rapid transmission by radio on shot day. Resurveys were made periodically until the contamination decayed to a safe level. The initial survey party was accompanied by a north road patrol, one officer and one driver in a ½-ton pickup. This team was directed into adjacent areas of interest, independent of the survey party.

A rapid helicopter survey was used to obtain readings at many critical points and to clear adjacent areas for work parties. A Jordan survey instrument with a 500-ft probe was installed in the helicopter for ground readings while the helicopter hovered above the point. This was later replaced by a 1500-ft probe. An AN/PDR-39 was carried inside the helicopter to provide monitoring services for the aircraft crew. The helicopter was equipped with radio communication to the Plotting and Briefing Office.

The main and access check point crews followed the initial survey teams and established these check points on their arrival in the areas.

1. The main check point provided monitoring service for all vehicles and personnel returning from contaminated areas. Facilities were available to turn in Rad-Safe equipment at this point, if desired. All vehicles found contaminated were marked with a "C" on the windshield and were directed to the Decontamination Station or the Rad-Safe hot-park. The station was located for each shot so that it would be between the contaminated areas and the Rad-Safe Building.

2. The access check points were located outside the 10 mr/hr line on the main access roads to the contaminated areas. Area access forms, issued by the Plotting and Briefing Section, were checked at the time a project or party entered the area. The time of entry was recorded. Upon leaving the contaminated areas the forms were returned to the check point monitors, who recorded the time of departure. At the end of the day these forms were turned in to the Plotting and Briefing Section for permanent record. Entries and departures of parties were reported to Plotting and Briefing by radio to provide a running account of parties and personnel in the contaminated areas. Personnel who did not have area access forms, signifying they had properly cleared Rad-Safe, were not admitted past the check points. All violators going into the contaminated areas without an area access form were reported by vehicle number to the On-site Rad-Safe Officer. When requested, these check points were available to offer Rad-Safe advice, show the entering parties the approximate location of isointensity lines, and advise as to length of stay in a hot area.

A sign-posting detail, consisting of one NCO and one assistant, posted signs indicating the 10 mr/hr and 100 mr/hr isointensity lines established by the survey parties on all access roads. The signs were relocated daily, following the decay in contaminated areas.

Two personnel monitors were stationed inside the hot entrance of the Rad-Safe Building to provide monitoring service to personnel returning from contaminated areas. This service was generally used only by personnel contaminated and so directed by the main check point. These men required all personnel to take off their tape, booties, and gloves and deposit them in the contaminated receptacles provided. An additional monitor stationed at the clean side of the decontamination station made a final check on personnel after they had cleaned up. The tolerance levels, using the MX-5 with the probe open, were as follows: 7 mr/hr outer clothing; 2 mr/hr on under clothing, respirators, hair, or any clothing in contact with the skin; and 1 mr/hr on the skin.

Program monitors were assigned to all test programs to act as liaison officers on matters pertaining to Rad-Safe procedures.

Party monitors from the Rad-Safe Group were assigned to entry parties upon request or by previous arrangement using the Test Director's Schedule of Events Card. These monitors made necessary arrangements for entry into the contaminated areas and provided monitoring service after entry. Ten stand-by monitors were always available at the Rad-Safe Building to meet any nonscheduled monitoring requirements.

Field survey instruments were issued to each monitor. The monitor was responsible for calibration of the instrument before each assignment.

4.2 PERIODIC ACTIVITIES

Section activity reports for each shot period are given in the following paragraphs. They contain a brief account of the significant happenings and routine work of the Monitoring Section.

4.2.1 Shot Wasp

For shot Wasp the initial survey party consisted of one officer and nine enlisted men, composing five teams. After personally reconnoitering their assigned areas, these teams ran four dry runs, the last complete with equipment and protective clothing. The helicopter team, consisting of three officers (two Air Force pilots and one officer monitor) and two enlisted men (one monitor and one probe operator from Program 2), reconnoitered the shot area and adjacent working areas for easily recognizable check points to be surveyed on D-day.

Two minutes after the shot, at 1202 hr, 18 February 1955, the initial survey party and two road patrol teams departed for their areas. The north patrol and initial survey party were detained by the security guards at a control point immediately north of the Rad-Safe Building and were not released to continue their mission until 1227 hr. No contamination of significance was found on Mercury Highway. The initial survey was hindered by the fact that the 10 mr/hr isointensity line exceeded the staked area in all directions. However, survey teams used their speedometers to measure the distance beyond the staked lines and finished their survey by 1325 hr.

After the 10 mr/hr and the 100 mr/hr isointensity lines were established, a sign detail of two men was dispatched to erect signs on all roads leading into the shot area to identify these two isointensity lines. The check point teams of two men each set up area access check points on the roads leading into the contaminated area. The main check point was established at 1337 hr at the intersection of Mercury Highway and the road leading into the shot area (the "Y" junction). This check point was manned by three monitors. Two monitors at the Rad-Safe Building for personnel monitoring found that the protective clothing proved sufficient to prevent any personal contamination since, after removing these items of protective clothing and equipment, no one required further decontamination.

Four Rad-Safe monitors were furnished to Project 3.1, five to 39.7, one to 2.2, two to 2.5.1, and one to 8.4 for shot day participation. In addition, 15 monitors were provided on the two days following the shot.

Resurveys were made at 1630 hr on 18 February and at 0930 hr on 19 February 1955. A final survey was made of Area 7-4 at 1200 hr, 25 February, and the maximum reading was 8 mr/hr. All survey data are shown in Chap. 3.

Twelve monitors were kept at the Rad-Safe Building, with instruments on a stand-by basis ready for immediate availability. These stand-by personnel were monitors who had finished their first monitoring assignment. There were not sufficient personnel for each man to have only one assignment.

The average total dosage received by the personnel on the four survey teams entering the shot area on both the initial and first resurvey was 615 mr. Both these surveys were made on the same day, and only one film badge was used by each monitor.

4.2.2 Shot Moth

The shot area was staked in the normal manner. Three daylight dry runs and one predawn dry run complete with equipment were held prior to shot day.

At 0547 hr, 22 February 1955, the initial survey party and two road patrol teams left the Rad-Safe Building on their assignments. A monitor was stationed outside the Rad-Safe Building to check for fall-out. None was detected. The road patrols found no contamination outside the shot area. The initial survey was completed by 0730 hr. The helicopter team started its mission at 0535 hr and returned at 0715 hr.

At 0615 hr, 22 February 1955, the area check point teams, main check point teams, and the sign-posting details departed to establish Rad-Safe control points.

On shot day Rad-Safe monitors were furnished to the following projects: five to project 39.7, one to 8.4, three to 3.1, one to 9.1, one to 12.1, one to 13.3, and one to Reynolds Electric Company. In addition, 12 monitors were furnished on the days immediately following. On shot day personnel not on a specific detail were kept on stand-by basis until recovery was completed.

Resurveys of the area were made on 23, 24, and 28 February and 4 and 9 March 1955.

The average total dosages for the initial survey and the first resurvey teams were 340 and 250 mr, respectively.

4.2.3 Shot Tesla

The stakes in Area 9b, originally extending to 1000 yd, were increased to 1500 yd from Ground Zero. The area was reconnoitered by the helicopter and ground teams for positive points of identification on the ground. The initial survey team held four dry runs.

At 0532 hr, 1 March 1955, the initial survey team left the Rad-Safe Building and assembled near the "Y" junction. At 0555 hr, the survey team was released by the On-site Rad-Safe Officer to start its survey; this team completed its survey at 0632 hr. The two road patrols that left with the initial survey team found Mercury Highway clear of contamination. The area and main check points were established at 0605 hr. The sign detail started posting the access roads at this time and finished posting the area after the initial survey was completed.

Two monitors were furnished to Project 8.4, one to 9.1, one to 22.1, and one to 24.1; and five other monitors were furnished to various nonscheduled parties. Two recovery people required decontamination by bathing. In both these cases their shoes, impractical to decontaminate, were placed aside to decay to a safe reading.

Resurveys were made on 1, 2, 4, and 8 March 1955.

The average total dosages for the initial and first resurvey teams were 600 and 550 mr, respectively.

4.2.4 Shot Turk

Preparation for this shot commenced prior to 8 February, but delays and individual dosage accumulation necessitated many changes in assignments of the initial survey personnel. Owing to rugged and difficult terrain and to these changes in assignments, eight dry runs were held. One stake line extending in the expected direction of fall-out was extended to 5000 yd. There was a total of seven stake lines radiating from Ground Zero, but one additional line was put in along the recovery road extending south from Bunker 2-380 to facilitate recovery from this area.

Owing to the predicted wind conditions for shot time, an evacuation plan was devised for the Control Point area. All personnel not essential in the area were evacuated. All remaining personnel in the area, including all Rad-Safe personnel, were issued film badges. All excess survey instruments in supply were issued. Rad-Safe personnel not having specific job assignments were loaded on buses or other available vehicles and held at the Rad-Safe Building. All excess film badges were forwarded to the Las Vegas Field Office 20 min before shot time. The scheduled personnel for the initial survey and area access check points were assigned specific missions in the event of fall-out in the Control Point area. Two check point teams were dispatched to the area north of the Rad-Safe Building, one team to Building 10, and the other team to Yucca Lake. One officer and three enlisted men were dispatched to Gate 4 to join security guards and form two teams to control evacuation of manned stations in the Yucca area. An initial survey team was dispatched to Building 400. The remaining three teams of the initial survey party and all officers of the Rad-Safe Group were held at the Rad-Safe Building for emergencies that might arise, sufficient vehicles standing by for their possible evacuation.

At 0630 hr, it was decided that fall-out would not touch the Control Point area, and personnel were withdrawn from evacuation positions. The initial survey team was reorganized at the Buster-Jangle "Y" junction and dispatched by Plotting and Brieting at 0645 hr. The survey was completed at 0915 hr. Two additional teams that had been added to the initial survey were sent in toward Ground Zero to obtain readings at Bunkers 2-380 and 2-300. Their routes of approach were along stake lines 9 and 2. One team succeeded in reaching Bunker 2-300, but

the fall-out across the recovery road prevented the second team from reaching Bunker 2-380 by the recovery road along stake line 9. This bunker was later reached by a member of the initial survey team by approaching along stake line 6 from the northwest.

The area and main check point teams were dispatched to their positions at 0650 hr. The sign-posting details were dispatched as soon as the survey had been completed.

Rad-Safe monitors were furnished to the following projects: three to Project 1.1, one to 1.2, two to 1.12, four to 1.14, two to 8.4, two to 30.3, four to 3.1, four to 38.1, one to 23.3, one to 23.5, one to 6.1.1, one to 33.1, one to Reynolds Electric and Engineering Company, and two to the Personnel Decontamination Station. In addition, 15 monitors were furnished to various parties on the days following shot Turk.

Resurveys were made 0630 to 0800 hr 8 March and 0900 to 1120 hr 9 March 1955.

The average total dosages for personnel of the initial survey and first resurvey teams were 1200 and 600 mr, respectively.

4.2.5 Shot Hornet

Four dry runs were held in the Hornet area, which was staked in the usual manner, except that lines which overlapped with old stake lines in Area 3 were given a letter designation to avoid confusion. Two minutes after the shot, at 0522 hr, the initial survey party was dispatched to an assembly point on Mercury Highway. At 0540 hr, the survey teams were released to start their survey. Two access check point teams and the north patrol were dispatched with the initial survey party. The access check point teams had the 10 mr/hr and 100 mr/hr signs posted along the main access roads and established their check points outside the 10 mr/hr line at 0545 hr. The main check point party was established at the intersection of Mercury Highway and south recovery road to Area 3a at 0550 hr. The sign detail was dispatched at R-hour to complete the posting of the area.

On shot day Rad-Safe monitors were furnished to the following projects: four to Project 39.7, two to 3.1, two to J-10, one to 39.6, one to 30.3, one to 12, one to 8.4, one to 8.3, one to 3.1, and one to 2.2. In addition, monitors were sent with a cable recovery party, a vehicle recovery group, a Sandia Corporation party, and two with Reynolds Electric and Engineering Company. On the days following, prior to the next shot, 15 additional monitors were furnished to various groups.

The average total dosages for the initial survey and first resurvey teams were 860 and 260 mr, respectively.

4.2.6 Shot Bee

Area 7-1a was staked in the normal manner, and four dry runs were held. The initial survey and helicopter teams reconnoitered the check points to be reported on shot day. Two monitors were sent to Gate 4 to assist J-3 prior to H-hour.

At H+2 min, 0507 hr, the initial survey party, the north and south road patrols, and the check point teams were dispatched. At 0515 hr, the helicopter team and the main check point party were dispatched. The area access check points were established at 0600 hr, and the main check point was established at 0610 hr.

On shot day Rad-Safe monitors were furnished to the following programs and projects: four to 39.7, two to 30.3, two to 6.1.1, one to 40.9, one to 13, one to 13.3, one to 40.1.5, one to 12, one to 2.2, and one to 8.4; three monitors were furnished to Reynolds Electric and Engineering Company.

The average total dosage for the initial survey party was 360 mr.

4.2.7 Shot Ess

The area for the underground shot, Area 10 (Appendix A and Fig. 3.37), was staked with nine stake lines. Stake lines 1, 2, and 9 were extended to 5000 yd. The lines in the east-southeast direction were considerably shorter than this owing to the mountainous terrain. In this direction various permanent markers from which to take readings were assigned the

monitors at predetermined points, and stakes on lines 2, 3, and 4 were marked with white lime so that the helicopter could take readings in case they were inaccessible to ground crews. In addition, a road running perpendicular to the predicted fall-out path to the east-southeast was staked. This road begins near stake 248 and extends south for approximately 6 miles down the valley east of Banded Mountain. To the south of Area 10, old markers from Area 9 could be used. Also, for this shot, two complete crews were trained for the helicopter, with one crew assigned to take a Ground Zero reading at H+2½ hr. For this survey a Jordan survey instrument, capable of reading as high as 10,000 r/hr, with an extended probe on a 1200-ft cable, was utilized.

The initial survey ground crew consisted of one monitoring team for each stake line (an officer-in-charge, a driver, and 18 men). Each team was trained for three separate stake lines as an additional familiarization with the area.

At 0730 hr on D-day the initial survey teams, road patrols, and check point personnel left the Rad-Safe Building for the "Y" junction on Mercury Highway to await the shot. After numerous delays the teams returned to the Rad-Safe Building for lunch and were dispatched again at 1110 hr. Directly after the shot the teams were dispatched to their assigned areas. The great amount of dust in the area delayed the start of the survey.

At H+10 min the helicopter team was dispatched from the Rad-Safe Building. The low-level flight was first conducted around the western and northern portion of Area 10 and indicated that the fall-out did not extend in that direction. The circle of Area 10 was completed. The eastern leg of this circle was accomplished by traversing the first valley of Banded Mountain. The highest reading made on the survey around the area was 70 r/hr at check point CF approximately 2500 yd east-southeast of Ground Zero. The helicopter than proceeded to the "Y" junction, where the alternate crew took over for the Ground Zero run. After the Ground Zero run was completed, the helicopter returned to Area 10 to survey stake line 3, which was inaccessible to ground survey crews owing to high contamination.

At 1300 hr all check points were established and appropriate signs posted, the latter being accomplished by the initial survey crews. The main check point was located at the "Y" junction. Road patrols found no contamination on Mercury Highway.

On shot day Rad-Safe monitors were furnished to the following projects: three to Project 2.5.1, two to 2.3, two to 2.5.2, and one each to 2.7.1, 6.1.2, and 30.3. One monitor was furnished to a security party. One monitoring requirement lasted throughout the night, and monitors were dispatched throughout the night on a shift basis of approximately 5 hr each shift. Twelve additional monitors were furnished for recovery parties on the succeeding two days.

The average total dosages for the initial survey and first resurvey teams were 815 and 485 mr, respectively.

This shot resulted in the largest personnel decontamination problem of any previous shot in this series. On shot day the main check point sent 105 persons through the personnel decontamination station. Of these, 70 were considered contaminated and 42 required decontamination by bathing to reduce radiation to a safe level. The most frequent hot spots were found to be the nostrils, sideburns, and necks, which often read over 20 mr/hr.

4.2.8 Shot HADR

There were no monitoring requirements for shot HADR.

4.2.9 Shot Apple

Preparation for this shot commenced 9 March; however, postponements and individual dosage accumulation necessitated many changes in assignments of the initial survey personnel. Owing to these changes and delays, it was necessary to hold six dry runs in Area 4. This area was staked in the normal manner extending out to 3600 yd, with seven stake lines radiating from Ground Zero. Owing to the geographical location of Area 4, plans were made to utilize stake lines from Area 2 to the north and Area 1 to the south, if required. Monitors were acquainted with terrain and station check points in these areas.

The initial survey party, road patrols, and check point personnel were dispatched to their areas at 0500 hr. The assembly area for the initial survey party was just south of the main access road to Area 1. The road patrol to the south found Mercury Highway and Frenchman Flat areas free of contamination. The road patrol to the north found Mercury Highway to the Buster-Jangle "Y" and the main access road to Area 7 free of contamination. The initial survey party was released from the assembly point by the On-site Rad-Safe Officer to begin their survey at 0520 hr. The direction of fall-out prevented the initial survey team assigned to stake line 1 from reaching this line, and it was necessary to complete the survey in this direction by utilizing stake lines from Area 2. It was also necessary for the team assigned to stake line 8 to approach from the west rather than from the east, as originally planned. The initial survey was completed at 0640 hr. The use of map check points located at terrain features and road intersections proved of immense value on the initial survey for this shot. The area and main check points were established 0520 hr. The sign detail started posting the access roads at this time and finished after the initial survey was complete.

On shot day monitors were furnished to the following programs and projects: one to 1.5, one to 3.1, one to 6.1.2, one to 15.1, two to 15.3, two to 15.4, one to 16, one to 30.3, three to 33, three to 39.4, one to 34.3, one to 37.3, four to 38.1, one to 39.4a, two to EG&G, three to Reynolds Electric and Engineering Company, and one for a Rad-Safe mission. Monitor requirements after shot date are included in the following section. Resurveys were made on 30 March and 2 and 6 April 1955.

The average total dosages for the initial and first resurvey teams were 485 and 222 mr, respectively.

4.2.10 Shot Wasp'

Preparation for this shot commenced 25 March 1955. The area was staked in the normal manner with eight staked lines radiating from 50 yd from Ground Zero and extending out to a distance of 3600 yd. Three dry runs were held by the initial survey party. Personnel in the initial survey party familiarized themselves with stake lines from Area 7-1a to the north and stake lines from Areas 3 and 3a to the south as additional known points. It was not considered necessary to assign any additional map check points for use by the initial survey party for this shot.

The initial survey party, check point teams, and road patrols were dispatched at 1002 hr to their assembly area south of the main access roads to Areas 1 and 3. The road patrol to the south found Mercury Highway and Frenchman Flat area free of contamination. The road patrol to the north found Mercury Highway free of contamination to the Buster-Jangle "Y." The initial survey party was released from the assembly point at 1033 hr by the On-site Rad-Safe Officer to begin their initial survey. The survey was routine. Teams were able to reach their stake lines on routes originally planned. The 10 mr/hr line was closed on all stake lines. The survey was completed at 1110 hr.

On shot day Rad-Safe monitors were furnished to the following projects: one to Project 2.3, one to 30.3, one to 39.4a, four to 39.7, and one to a Rad-Safe mission. On the days following this shot, until 5 April, monitors were furnished as follows: one to J-12, seven to 39.7, one to 6.1.1, two to 2.5.1, four to 34.3, one to 8.4, seven to 3.1, two to 33.4, two to 39.5, five to 2.3, one to 15.4, one to 1.1, one to Silas Mason Co., one to 2.2, two to 39.4b, one to 9.1, five to 2.7.1, three to Reynolds Electric and Engineering Company, one to 2.5.2, and one to 13.1.

Since shots Apple and Wasp' were fired on the same day, it was necessary to assign monitors on a time of entry basis, rather than in advance, as was done for previous shots. This plan was successful, and all requests for monitors were met without delay, although individual monitors often made two and three trips into the area in order to meet all requirements.

Resurveys were made on 30 March and 2 April 1955. The average total dosages for the initial and first resurvey teams for Wasp' were 579 and 394 mr, respectively.

4.2.11 Shot HA

Preparation for this shot began on 30 March with a reconnaissance, by the officers-in-charge of the initial survey party and Alpha emergency team, of area and road network in the vicinity of shot point 5. Two dry runs were held by the initial survey party. An additional access check point was organized as a precautionary measure.

Immediately after the shot the main and access area check point teams were dispatched and were in position at 1015 hr. It was not necessary to dispatch the initial survey party.

Two monitors were furnished to Projects 2.1 and 2.2, and one monitor was furnished to Project 39.4a on shot day. These groups were on cannister recovery details.

4.2.12 Shot Post

Preparation for this shot started 31 March 1955 and consisted of placing eight stake lines radiating from Ground Zero to a distance of 3600 yd and training the initial survey teams on their approach routes to the area. If contamination went north, the already existing stakes in Areas 9 and 10 would be used, and a series of map check points (road intersections, project stations, and prominent terrain features) were established as known points. Three dry runs were made in the area.

At 0432 hr on shot day, 9 April 1955, the initial survey party, together with the area and main check points and north and south road patrols, was dispatched from the Rad-Safe Building to the assembly point located at the Buster-Jangle "Y." They were released from the assembly point to begin the survey at 0455 hr. The survey was completed at 0600 hr. The check point reported in position on Mercury Highway at 0445 hr. It was necessary to locate the check point south of Areas 1 and 3 since all areas to the north were contaminated by the shot. At 0635 hr, the north road patrol reported that the Buster-Jangle "Y" was reading over 200 mr/hr. At H+30 min, a monitor was dispatched to the main access road to the Yucca airstrip to report periodic intensity readings at this point. All these readings were negative. The sign detail, dispatched on completion of the survey, reported that all access roads were posted by 1030 hr.

On shot day two monitors were furnished for Project 2.2, one for 21.1, one for 22.2, one for Security, and three to Reynolds Electric and Engineering Company. During the period 10 April to 14 April 1955, two monitors were furnished Silas Mason Co. and Reynolds Electric and Engineering Company, one for Project 2.7.1, one for Project 8.4, one for Project 30.1, and one for Project 2.5.2.

Resurveys were made on 11, 12, and 21 April 1955. The average doses for the initial and first resurvey teams were 638 and 214 mr, respectively.

4.2.13 Shot Met

Preparation for this shot commenced 30 March 1955, with the staking of the area in the normal manner. Eight stake lines, radiating out from Ground Zero to a distance of 3600 yd, were established. A series of map check points in the form of road intersections and prominent terrain features were established for the use of the initial survey party. Three dry runs were held in this area by the initial survey party.

For this shot the initial survey party and check points were split into two groups. One group consisted of the Officer-in-charge, initial survey party, teams to run stake lines 1 and 2 and 7 and 8, and one area access check point team. This group departed from the Rad-Safe Building at 1117 hr and proceeded south to the Met area. The other group consisted of the On-site Rad-Safe Officer, teams to run stake lines 5 and 6, one area and one main check point team, and a detachment to operate Plotting and Briefing and the Dosimetry and Records Section. This group left Ranger Control Point area at 1117 hr and proceeded north to the main access road to Frenchman Flat. The team to run stake lines 3 and 4 and the south area access check point departed Ranger Control Point at 1117 hr, proceeding north via pumphouse road. All teams of the initial survey party were given predesignated points at which to wait for final instructions from the On-site Rad-Safe Officer prior to beginning their survey. Teams were released individually starting at 1150 hr for the team on the main access road: The

survey was completed at 1305 hr. The Officer-in-charge, initial survey party, and On-site Rad-Safe Officer performed the road patrol duties during this movement. Mercury Highway was found to be free of contamination. All check points were in position by 1200 hr. The sign details began posting the access roads at 1300 hr.

On shot day monitors were furnished the following programs and projects: one to 1.10, one to 1.12, three to 1.13, one to 1.5, one to 2.2, two to 2.7.1, one to 3.1, one to 3.8, one to 3.10.1, one to 5.4, two to 5.4 and 5.5, one to 6.1.1, one to 6.1.2, four to 8.4, one to 9, two to 13.1, and two to Reynolds Electric and Engineering Company. During the period 16 to 25 April, monitors were furnished the following projects and programs: fifteen to 9.1, four to 1.5, one to 3.7, four to 5.5, three to 9, ten to 3.1, two to 2.7.1, three to 3.2, one to 34.2, one to 2.4, one to 1.6, one to 1.14, one to 12, one to 8.4, two to 5.4, two to Reynolds Electric and Engineering Company, two to 2.5.2, one to 2.1, one to 6.1.2, one to 2.6, one to 1.11, one to the Test Director, one to the Visitor's Bureau, one to DWET, one to 3, and one to DOD motor pool.

Resurveys of the area were conducted on 16, 18, 20, and 26 April 1955. Average exposures for the initial and the first resurvey teams were 440 and 241 mr, respectively.

4.2.14 Shot Apple II

Preparation for this shot commenced 18 April with the staking of the area in the normal manner. Seven stake lines radiating from Ground Zero out to a distance of 3600 yd were established. One additional stake line was established along the Desert Rock road for approximately 3000 yd. Four dry runs were held in this area by the initial survey party. Personnel of the initial survey party were familiarized with stake lines from Areas 4 and 2 to the north. Map check points consisting of road intersections and prominent terrain features were also established as additional known points.

The initial survey party, together with area check point and main check point teams and north road patrol, departed from the Rad-Safe Building at 0512 hr and proceeded to their assembly point. They were released at 0550 hr by the On-site Rad-Safe Officer to begin their survey, which they completed at 0650 hr. The survey was routine in nature, although it was necessary to utilize stake lines from Area 4 to complete the survey. The road patrol found Mercury Highway free of contamination to the north and south. The north road patrol was dispatched to the Federal Civil Defense Administration (FCDA) villages at 0557 hr; the 4700-ft village was found to be reading 120 mr/hr. At 0705 hr the north patrol was sent to Station 1-380, and it was found to be reading greater than 50 r/hr. At 0650 hr a monitor was dispatched to Station 34.3b-2, and this station was found to be reading over 50 r/hr. Three area check points and one main check point were established for this shot and were in position at 0600 hr. The sign detail began posting the main access road at 0830 hr. All access roads were posted by 1030 hr.

Monitors were furnished to the following programs and projects on shot day: 3.1, 15.3, 15.4, 16, 31.1, 31.4, 31.5, 35, 35.1, 35.3, 35.4a, 35.4b, 37, 39.4a, 40.1, FCDA Damage Survey, Reynolds Electric and Engineering Company, FCDA Photo, and Silas Mason Co. During the period 6 through 9 May, monitors were furnished the following programs and projects: three to 35.5, two to Reynolds Electric and Engineering Company, two to 35.4a, two to 35, two to 39.4b, and one each to Program 12, Projects 15.4, 31.5, 39.4, 40.1, 3.1, and 9.1.

This area was resurveyed on 6 and 9 May. Average exposures for initial and first resurvey teams were 1026 and 728 mr, respectively.

4.2.15 Shot Zucchini

Preparations for this shot commenced 20 April 1955. The area had previously been staked for another shot out to a normal distance of 3600 yd from Ground Zero with eight stake lines. The only requirement was to replace damaged and missing stakes. Four dry runs were held in this area by the initial survey party. The initial survey party was also familiarized with stake lines from Areas 9b, 9c, and 10 to the north and Areas 7-4, 3, and 3a to the south. No special map check points were established for this area since sufficient points were available from previous shots.

The initial survey party, together with area access check point and main check point teams and north patrol, departed from the Rad-Safe Building at 0502 hr and proceeded to their assembly area. They were released by the On-site Rad-Safe Officer at 0528 hr to begin the initial survey. This survey was routine in nature and was completed at 0612 hr. The road patrols found Mercury Highway to be free of contamination. The check points were in position at 0515 hr. The sign detail completed posting of the main access roads at 0830 hr.

Monitors were furnished to the following projects: one to 16.1, one to 13.3, one to Security, one to Reynolds Electric and Engineering Company, and one to DWET. During the period 10 through 16 May 1955, monitors were furnished to the following projects: two to Reynolds Electric and Engineering Company and one to 34.3.

The area was resurveyed on 16 May 1955. Average exposures for the initial and first resurvey parties were 608 and 368 mr, respectively.

4.3 SUMMARY

During the operation a total of 420 monitors was furnished to parties requiring entry into contaminated areas.

It is recommended that the total number of military vehicles be increased to 14. These vehicles should all be radio equipped.

CHAPTER 5

LOGISTICS

5.1 INTRODUCTION

The mission of the Logistics Section was to provide complete logistical support of the Rad-Safe Group for Operation Teapot. This included procurement, issue, repair, storage, and maintenance of all radiac devices and Rad-Safe equipment used at NTS for the Rad-Safe Group and test personnel and to provide necessary military and civilian type vehicles to support the activities of the Rad-Safe Group.

This section, headed by Capt George G. Wyman, Jr., 1st Rad-Safe Support Unit, was composed of three sections: General Supply, Instrument Repair, and Transportation, which were organized as follows:

1. The General Supply Section was composed of an officer and 18 enlisted men from the 1st Rad-Safe Support Unit. Six men were assigned to issue and receive Rad-Safe equipment. Three men were required to operate the laundry on two 8-hr shifts. Additional duties for the men assigned to this section consisted in driving, general clerk, and general monitoring duties. The section was under the supervision of an NCO. The three additional men were utilized on a rotational basis to provide time off for the permanent personnel.

2. The Instrument Repair Section was composed of nine enlisted men. Five of these men were assigned as instrument repairmen, and three were assigned as issue clerks. Three of the five repairmen were separated from the Unit on 1 March for administrative reasons. These men performed their duties under the supervision of an NCO from Field Command, AFSWP.

3. The Transportation Section was composed of seven enlisted men. Two of these men were mechanics and four were drivers and performed their duties under the supervision of an NCO. All seven were from the 1st Rad-Safe Support Unit. This section performed only first echelon maintenance. The AEC and DOD motor pool provided all other maintenance.

Preliminary support for Operation Teapot in the General Supply Section began early in the month of December 1954. All supplies that had been stored in Mercury after previous operations were moved to the Forward Area and stored in the supply room of the Rad-Safe Building. An inventory was made of all equipment to bring the logistic requirements up to date. A stock record accounting system was instituted so that a running check could be kept on all supplies. A standard procedure was developed for the issue and receipt of supplies. Coveralls, respirators, and other equipment which would be issued and turned in frequently were issued on a mimeographed hand receipt prepared for the purpose. Hand receipts for personnel entering contaminated areas were taken over to the receiving counter and returned when the contaminated items were turned in. Booties, gloves, and headgear were not accounted for on the hand receipts since provisions for turning them in were made at a forward check point where it was not feasible to keep records. Coveralls issued to the Rad-Safe Building personnel which were not expected to become contaminated were issued on the same hand receipt but kept in a separate file. When these items were soiled, they were turned in over the counter in exchange

for clean coveralls, with no entry being made on the hand receipt. All other items of non-expendable supplies were issued on hand receipts or WD Form 446.

The General Supply Section was responsible for all laundry equipment in the Rad-Safe Building. Since the automatic drying facilities were not adequate to handle the anticipated workload, outside clothes lines were installed to handle the overload. All contaminated clothing was separated during processing through the personnel decontamination station and deposited in special receptacles, handled with rubber gloves, and laundered in separate batches.

The Instrument Repair Section, in preparation for Operation Teapot, moved the repair facilities from Camp Mercury into the Rad-Safe Building. A walk-in refrigerator was installed and became operative during the month of December 1954 for refrigerated storage of radiac instrument batteries and film badges. The repair of radiac instruments and survey of replacement parts and batteries began as early as July 1954. By the beginning of January 1955, practically all instruments were serviceable, and the stock of batteries and replacement parts was considered satisfactory to fill the anticipated requirements for the complete operation. Calibration of all instruments commenced 1 February 1955 and by 15 February was complete except for a small number of MX-5's not required for the beginning of the operation. Additional instruments for support of the operation were received from the 1st Rad-Safe Support Unit, AEC, and DOD on a loan basis. The total number of instruments serviced during this preparatory period was as follows: AN/PDR-39, 263; MX-5, 89; Juno, 15; Victoreen Thyac 389, 85; and Pee Wee alpha survey meter, 8. In addition, 23 chargers for pocket dosimeters were serviced and approximately 2250 dosimeters were worked over. The calibration of instruments was accomplished on a field type calibration range utilizing a 1-curie source of Co^{60} and a UDM-1 collimated 8-curie source located in the basement of the Rad-Safe Building. The field type range was located to the south of the Rad-Safe Building and had seven radial legs with marked distances for rapid calibration checks.

The Transportation Section, which coordinated and supervised transportation for the Rad-Safe Group, handled two 4-door sedans, one of which was radio equipped; five ½-ton pickups, three of which were radio equipped; two 8-passenger carryalls; six ¾-ton 4 × 4's; and four ¼-ton military vehicles, all radio equipped. Three AEC busses were used to transport the bulk of personnel to and from Camp Mercury. Because it was not possible to fulfill all the military vehicle requirements at the NTS, four of the ¾-ton vehicles were obtained from the 1st Rad-Safe Support Unit and driven overland from Fort McClellan, Ala., for the operation. Arrangements were made for additional vehicles during rush periods. During the early phases of the operation, four ¼-ton 4 × 4's that were to be expended in effects tests were borrowed to augment the assigned vehicles.

5.2 PERIODIC ACTIVITIES

A brief résumé of the activities of the Logistics Section follows. It should be kept in mind that this does not include initial issues that were made prior to the start of the operation, such as hundreds of coveralls, caps, booties, and approximately 100 survey instruments.

5.2.1 Shot Wasp

The Logistics Section performed the duties assigned with no unusual incidents. This workload is summarized in the following table.

	General Supply		
Item	Issued	Received	Laundered
Coveralls	215	158	158
Caps	210	200	200
Booties (pair)	205	200	200
Gloves (pair)	150	147	145
Respirators	72	72	72

Instrument Repair Section

Item	Issued	Received
AN/PDR-39	120	15
MX-5	55	10

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	521	53 gal
3/4 ton 4 × 4	302	51 gal

Nine vehicles were deadlined during this period; on shot morning all vehicles were on the ready line and in good repair. In addition to military type vehicles, nine civilian type vehicles received heavy usage daily in support of Rad-Safe activities.

A LEROY lettering set for use in the Plotting and Briefing Section was ordered through Reynolds Electric and Engineering Company. In addition, miscellaneous spare parts for dosimeter and radiac instruments were ordered.

5.2.2 Shot Moth

The Logistics Section encountered no unusual incidents in performing assigned duties for this shot. The workload is reflected in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	144	132	285
Caps	213	184	307
Booties (pair)	204	183	270
Gloves (pair)	217	202	378
Respirators	162	96	150

Instrument Repair Section

Item	Issued	Received
AN/PDR-39	99	42
MX-5	74	20
Model 2610	8	8
Thyac 389	21	14

In addition, six Pee Wee alpha survey meters were calibrated and placed on a stand-by status at D−2 hr.

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	453	121 gal
3/4 ton 4 × 4	576	196 gal

In addition, nine civilian type vehicles were utilized on a daily dispatch basis.

During this period 250 pocket dosimeters 0 to 5 r, Bendix model 611, were ordered with two Bendix dosimeter charging units to supplement the supply of dosimeters on hand at this time. Thirty-five miscellaneous line items of tools and spare parts were ordered for the Instrument Repair Section.

5.2.3 Shot Tesla

The Logistics Section started work on modification of the field type calibration range located south of the Rad-Safe Building. Lowering of seven radial legs and the source pedestal to a height of 32 in. was started on 28 February 1955.

The Logistics Section performed the work indicated in the following table in support of this shot.

General Supply

Item	Issued	Received	Laundered
Coveralls	234	220	273
Caps	273	195	252
Booties (pair)	276	222	255
Gloves (pair)	186	114	247
Respirators	167	130	152

Instrument Repair Section

Item	Issued	Received
AN/PDR-39	101	64
MX-5	71	32
Model 2610	8	8
Thyac 389	20	12

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	833	145 gal
3/4 ton 4 × 4	935	222 gal
2 1/2 ton, Decon	97	21 gal

During this period miscellaneous office supplies and paint for the field type calibration range were ordered from the Reynolds Electric and Engineering Company Purchasing Department.

5.2.4 Shot Turk

The Logistics Section carried out its assigned mission with no unusual incidents. The workload is indicated in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	128	120	284
Caps	128	109	208
Booties (pair)	128	167	130
Gloves (pair)	128	177	206
Respirators	105	97	135

Instrument Repair Section

Item	Issued	Received	Calibrated
AN/PDR-39	125	130	31
MX-5	89	35	0
Model 2610	7	7	0
Thyac 389	23	16	0

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	464	92 gal
3/4 ton 4 × 4	532	133 gal

Three vehicles were deadlined during this period.

Nineteen miscellaneous line items of spare parts were ordered for the Instrument Repair Section.

5.2.5 Shot Hornet

During this period the Logistics Officer was designated Officer-in-charge of the main body of Rad-Safe personnel in the event evacuation of Rad-Safe personnel became necessary for this shot. The workload is indicated in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	161	211	220
Caps	153	175	141
Booties (pair)	131	153	166
Gloves (pair)	164	112	169
Respirators	161	143	114

Instrument Repair Section

Item	Issued	Received	Calibrated
AN/PDR-39	139	76	40
MX-5	78	24	0
Model 2610	9	9	0
Thyac 389	21	14	0

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	545	117 gal
3/4 ton 4 × 4	1106	236 gal

From specifications prepared by the Dosimetry and Records Section, 10,000 du Pont film badges were ordered to meet operational requirements.

5.2.6 Shot Bee

The Logistics Section carried out its assigned duties with no unusual incidents. The workload is tabulated in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	396	426	426
Caps	350	338	479
Booties (pair)	390	401	698
Gloves (pair)	378	367	476
Respirators	231	231	231

Instrument Repair Section

Item	Issued	Received	Calibrated
AN/PDR-39	267	211	32
MX-5	89	40	16
Model 2610	8	8	4
Thyac 389	31	31	20

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	621	90 gal
3/4 ton 4 × 4	896	269 gal

In addition, 10 civilian type vehicles were utilized during this period. On shot morning all vehicles were on the ready line in good condition.

Twenty-nine miscellaneous spare parts for radiac instruments were requisitioned during this period.

5.2.7 Shot Ess

The Logistics Section carried out its assigned duties with no unusual incidents. The workload is tabulated in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	454	413	387
Caps	454	387	387
Booties (pair)	454	410	405
Gloves (pair)	450	405	396
Respirators	301	301	301

Instrument Repair Section

Item	Issued	Received	Calibrated
AN/PDR-39	251	205	56
MX-5	89	41	17
Model 2610	9	9	3
Thyac 389	33	33	20

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	722	140 gal
3/4 ton 4 × 4	1344	340 gal

Three of the military vehicles were deadlined during part of this period; twelve civilian type vehicles were utilized during this period.

Thirty-three miscellaneous items of spare parts and tools for instrument repair were ordered during this period.

5.2.8 Shot HADR

Since HADR was a dry run only, Logistic support is not shown for this shot.

5.2.9 Shots Apple and Wasp'

Shots Apple and Wasp' were detonated on the same day. The Logistics Section carried out its assigned duties for this period with no unusual incidents. The workload is tabulated in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	484	502	606
Caps	484	358	358
Booties (pair)	484	480	850
Gloves (pair)	484	570	524
Respirators	309	309	309

Instrument Repair Section

Item	Issued	Received	Calibrated
AN/PDR-39	258	192	41
MX-5	89	40	7
Model 2610	7	7	0
Thyac 389	24	21	0

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	804	121 gal
3/4 ton 4 × 4	1816	352 gal

In addition, 10 civilian type vehicles were utilized and 3 military vehicles were deadlined during this period.

Seventeen miscellaneous items of office supplies and twenty-three items of instrument spare parts were ordered.

5.2.10 Shot HA

The Logistics Section carried out its assigned duties with no unusual incidents. This being a high-altitude air drop, no support is being tabulated against this shot.

5.2.11 Shot Post

The Logistics Section performed its assigned duties for this period with no unusual incidents. The workload is tabulated in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	77	73	97
Caps	77	75	96
Booties (pair)	77	74	96
Gloves (pair)	77	75	71
Respirators	20	20	20

Instrument Repair Section

Item	Issued	Received	Calibrated
AN/PDR-39	136	92	32
MX-5	57	17	20
Model 2610	12	12	5

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	428	85 gal
3/4 ton 4 × 4	870	174 gal

In addition, 10 civilian type vehicles were utilized during this period, and there were 5 deadlines on military vehicles.

Five miscellaneous line items were ordered for the Instrument Repair Section and three line items for the Rad-Safe laundry.

5.2.12 Shot Met

The Logistics Section operated an issue point at the junction of the main access road to Frenchman Flat and Mercury Highway. This activity was operated for a period from shot day until 25 April 1955. Also during this period the Logistics Section supported the Canadian Rad-Defense Unit. This consisted of laundering of protective clothing and instrument repair support. The workload is tabulated in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	423	411	314
Caps	423	400	397
Booties (pair)	423	384	384
Gloves (pair)	423	389	389
Respirators	108	108	108

Instrument Repair Section

Item	Issued	Received	Calibrated
AN/PDR-39	253	197	47
MX-5	89	43	51
Model 2610	16	16	13
AN/PDR-34	15	15	12
Juno	3	3	3

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	1033	175 gal
3/4 ton 4 × 4	845	120 gal

In addition, 12 civilian type vehicles were utilized. There was a total of six deadlines on the military type vehicles during this period.

Forty line items of spare parts and tools were ordered for the Instrument Repair Section, and two line items were ordered for the Plotting and Briefing Section.

5.2.13 Shot Apple II

The Logistics Section carried out its assigned duties for shot Apple II without incident. The workload is indicated in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	677	653	768
Caps	359	350	363
Booties (pair)	553	547	551
Gloves (pair)	232	230	232
Respirators	265	265	265

In addition, the Supply Section shipped 33 footlockers to Fort McClellan, through Railway Express for personnel departing from the NTS.

Instrument Repair Section

Item	Issued	Received	Calibrated
AN/PDR-39	257	200	63
MX-5	89	49	31
Model 2610	19	19	12
Thyac 389	18	18	0

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	408	80 gal
3/4 ton 4 × 4	870	169 gal

In addition, 12 civilian type vehicles were utilized during this period.

Ten thousand Forms R101 were procured for the Dosimetry and Records Section. In addition, 13 miscellaneous line items were ordered from Reynolds Electric and Engineering Company.

5.2.14 Shot Zucchini

The Logistics Section carried out its assigned mission for shot Zucchini with no unusual incidents. The workload is reflected in the following table.

General Supply

Item	Issued	Received	Laundered
Coveralls	172	631	631
Caps	172	271	271
Booties (pair)	172	860	860
Gloves (pair)	170	403	403
Respirators	160	498	498

During this period the Laundry Section assisted the Canadian Rad-Defense Unit in its laundry of protective clothing.

Instrument Repair Section

Item	Issued	Received	Calibrated
AN/PDR-T1B	125	80	60
MX-5	89	57	30
Model 2610	5	5	0
Thyac 389	8	8	83

Transportation Section (Military Vehicles)

Vehicle	Miles	Gasoline
1/4 ton 4 × 4	800	160 gal
3/4 ton 4 × 4	1201	210 gal

In addition, 12 civilian type vehicles were utilized during this period.

A Pako Temp control unit was ordered, and a work order for a developing tank was submitted. This equipment was for interim dosimetry work.

5.3 RECOMMENDATIONS

An additional dryer is needed for the Rad-Safe Building. Present drying capacity is much less than the washing capacity.

A total of 14 military type vehicles, all radio equipped, should be requested for the next operation. All these should be 3/4-ton 4 × 4 trucks because they are much more maneuverable than 1/4-ton vehicles in the irregular terrain of Yucca Flat.

CHAPTER 6

VEHICLE AND EQUIPMENT DECONTAMINATION SECTION

6.1 INTRODUCTION

The mission of the Vehicle and Equipment Decontamination Section was to decontaminate all vehicles and equipment used in contaminated areas and to clear for shipment all radioactive samples being removed from the test area.

The Section was composed of one officer, 2d Lt F. N. Peters III, and seven enlisted men. The enlisted men were assigned as follows: one NCO in charge, two drivers, three decontamination specialists, and one records clerk. All personnel were subject to call by the Monitoring Section for assignment as monitors. All personnel were from the 1st Rad-Safe Support Unit.

The primary piece of equipment used by the section was a Kerrick Kleaner fixed steam and hot water generator manufactured by the Clayton Mfg. Co. and provided by the AEC. Survey instruments used were the AN/PDR-39 and the Beckman MX-5. Although the Section accomplished most of its work in a fixed location, mobility was provided by two decontamination trucks (Chemical Corps nomenclature, PDDA M3A3). These trucks were the property of the 1st Rad-Safe Support Unit.

Film badges were obtained from the Dosimetry and Records Section on a weekly basis to provide for personnel dosage measurement. Knee-length rubber boots and heavy rubber gloves, worn over the protective coveralls, were the only protection equipment used for the personnel.

Vehicles and equipment were brought to the station after they had passed through check points in the Forward Areas and had been found to be contaminated. They could be monitored again at the decontamination station prior to decontamination if necessary. Decontamination consisted primarily of washing the contaminated piece of equipment with steam and hot soapy water. Ramps were provided to facilitate drainage of the wash water from the equipment. After decontamination was completed, the vehicle or equipment was again monitored and returned to service if a satisfactory level was reached. If not, further decontamination was undertaken until the correct level was obtained. In a few cases decontamination was not possible even after five or six attempts. In such cases the vehicle or equipment was placed in a hot park, which was located adjacent to the decontamination building. This hot park was under the control of the decontamination section, and vehicles or equipment could not be removed without the approval of the section officer or sergeant. Equipment parked in this area was monitored frequently, and, as soon as the contamination had decayed to a safe level, the equipment was returned to service.

A record was kept by the section which indicated the vehicles and equipment decontaminated by type and number. This record was compared with the record kept by the Forward Area check points to determine that all contaminated vehicles had reported for required decontamination.

All contaminated matériel to be shipped from the NTS was sent through the decontamination section, where it was inspected in accordance with the instructions contained in Sec. 6.3 (Inclosure 1).

A standard operating procedure was prepared for this section which included safety precautions to be taken when operating the various equipment of the section.

6.2 PERIODIC ACTIVITIES

A section activity report follows for each shot period and contains a brief account of the significant happenings and routine work of the Vehicle and Equipment Decontamination Section.

6.2.1 Shot Wasp

During the period 18 through 21 February 1955, 21 trucks and 3 sedans were decontaminated. In addition to this, 16 items of miscellaneous test equipment were placed in the hot park for temporary storage. Surveys of the area indicate that the background of the station did not increase materially during this period.

6.2.2 Shot Moth

During the period 22 through 28 February 1955, 19 vehicles and 137 items of miscellaneous test equipment were decontaminated. Forty-six items of equipment were placed in the hot park for temporary storage and decay of activity. Six items were cleared for removal from the Control Point area.

6.2.3 Shot Tesla

During the period 1 through 6 March 1955, 34 vehicles, including 2 buses, and 30 items of equipment were decontaminated. Forty-seven items of equipment and one truck were placed in the hot park for temporary storage. Five samples were cleared for shipment from the NTS.

6.2.4 Shot Turk

During the period 7 through 10 March, 36 vehicles and 10 items of equipment were decontaminated. Six items were placed in the hot park for temporary storage.

6.2.5 Shot Hornet

During the period 11 through 21 March 1955, 36 vehicles and 65 items of equipment were decontaminated. Eighty-six items were placed in the hot park. One box of gold samples and 124 contaminated samples and equipment were cleared for shipment from the NTS.

6.2.6 Shot Bee

On 22 March 1955, 12 vehicles and 5 items of equipment were placed in the hot park.

6.2.7 Shot Ess

During the period 23 through 28 March 1955, vehicles and equipment were more heavily contaminated than usual. Background readings were taken at the decontamination station. A maximum reading of 2 mr/hr was reached on 27 March.

During this period 101 vehicles and 115 items of equipment were decontaminated and cleared for removal to Camp Mercury or shipment from the NTS. Also cleared for shipment were 471 samples, and 21 items of equipment were placed in the hot park.

6.2.8 Shots Apple and Wasp'

The period covered by this section is from 29 March to 5 April 1955. Shots Apple and Wasp' were both detonated on 29 March; however, the majority of equipment to be decontaminated was from the Ess area.

During this period 73 vehicles and 7 trailers were decontaminated. Six of the trailers and one of the vehicles were placed in the hot park prior to decontamination. Fifty-three items of equipment were placed in the hot park, and 163 items of equipment and 64 samples were cleared after decontamination for removal to Camp Mercury. Two samples were cleared for shipment by courier, and 15 boxes of samples, which met Interstate Commerce Commission regulations, were cleared for commercial shipment by air.

The highest level of area contamination reached at the decontamination station was 2 mr/hr on 1, 2, and 3 April 1955.

6.2.9 Shot HA

The period covered by this report is from 6 April to 8 April 1955. Shot HA presented no Rad-Safe problems other than the storage of 21 cannisters and 7 cargo type parachutes in the hot park after removal, by project personnel, of the instrumentation within the cannisters.

During this period 18 vehicles used in the Yucca area were decontaminated.

6.2.10 Shot Post

During the period 9 April through 14 April 1955, 31 vehicles and a truckload of samples were decontaminated and cleared for removal to Camp Mercury. Four vehicles and 17 items of equipment were placed in the hot park. In addition, 50 items of equipment were decontaminated.

The maximum background reading during this period was recorded at 0820 hr, 10 April, as 3 mr/hr. All other readings during this period were 1 mr/hr.

6.2.11 Shot Met

During the period 15 April through 4 May 1955, the decontamination station decontaminated and cleared 63 vehicles, decontaminated 49 items of equipment, and placed 13 items of equipment in the hot park.

From R-hour on shot day until D+2 day, a Decon truck was stationed at the main access road to the Frenchman Flat area. This station decontaminated and cleared 7 vehicles for removal to Camp Mercury.

Background readings for this period were normally 1 mr/hr. A maximum reading of 5 mr/hr was reached at 0820 hr, 16 April 1955.

6.2.12 Shot Apple II

During the period 5 May through 9 May 1955, the Decon section decontaminated and cleared 59 vehicles for removal to Mercury, cleared 23 items for shipment, and placed 107 items of equipment in the hot park.

The maximum background reading was 4 mr/hr at 0750 hr, 6 May 1955. All other days during this period covered were 3 mr/hr.

6.2.13 Shot Zucchini

During the period 10 through 16 May 1955, the Decon station decontaminated one truck. Background readings were not over 1 mr/hr during this period.

6.3 SHIPPING INSTRUCTIONS

The following Information Letter and inclosures outline the shipping procedures for radioactive material.

UNITED STATES ATOMIC ENERGY COMMISSION
OFFICE OF THE TEST DIRECTOR
CONTINENTAL TEST ORGANIZATION
P. O. BOX "O"
MERCURY, NEVADA

7 February 1955

TEST DIRECTOR'S INFORMATION LETTER NO. 21

TO: Distribution

SUBJECT: SHIPPING RADIOACTIVE MATERIAL FROM NEVADA TEST SITE

SYMBOL: RS-6

1. The following procedure should generally be followed by a project or agency prior to shipment of radioactive material.

a. The project should contact the On-Site RadSafe Officer so that the radiation level may be obtained prior to packaging.

b. The object will be packaged by the project so as to reduce radiation to the limits indicated in this letter.

c. The On-Site RadSafe Officer will be contacted to have the packaged item surveyed.

d. An Officer of the RadSafe Unit will record the information on the attached form (Incl. 1), in triplicate. The original will be attached to the container, the duplicate retained by RadSafe, and the triplicate will be retained by the sender.

2. For freight or railway express shipments ICC regulations will be followed. For mail shipments Post Office Department Regulations will be followed. Commercial air shipments will comply with interim regulations that have been established. Pertinent extracts of these regulations are attached as Incl. 2.

3. Shipments which do not meet the above regulations may be transported by carrier with a courier accompanying the shipment. The courier will clear the item as prescribed in paragraph 1 above and receive a proper release before leaving NTS. He will be required to show that adequate precautions have been taken to protect all personnel from possible external and/or internal exposure during the trip. He will obtain film badges from the Dosimetry and Records Section, and upon arrival at destination and release of material will return the badges to this section. He may mail the badge to the On-Site RadSafe Officer, Nevada Test Site, Mercury, Nevada, ATTN: Dosimetry and Records Section.

4. Projects required to ship contaminated material from NTS without delay after recoveries, should make advance arrangements with the On-Site RadSafe Officer.

5. The Test Manager concurs in the above.

FOR THE TEST DIRECTOR:

TOM D. COLLISON
LtCol, Arty
On-Site RadSafe Officer

TDC:bos

Distribution:
55 - Dir, CETG
50 - Dir, MEG
20 - UCRL (V. Denton)
20 - LASL, J-3
5 - LVFO
1 - Test Director
1 - G. Felt
1 - B. C. Lyon
1 - Col H. E. Parsons
3 - LtCol D. I. Prickett

INCLOSURE 1

SHIPPING RELEASE FOR RADIOACTIVE MATERIAL

DATE OF SURVEY_____ TIME_____ BY_____

TYPE OF MATERIAL_____

RADIATION LEVEL PRIOR TO PACKAGING_____ at_____ (in) (cm)

RADIATION LEVEL OUTSIDE OF PACKAGE_____ at_____ (in) (cm)

NUMBER OF UNITS FROM PACKAGE (mrhm)_____

TYPE OF PACKAGING_____

OWNER_____

DESTINATION_____

TO BE SHIPPED BY: RR EXPR( ): FREIGHT( ): POST O( ): AIR( )

REMARKS:_____

THIS PACKAGE MEETS REGULATIONS FOR SHIPMENT BY MEANS SHOWN

RELEASED BY_____ DATE_____

INCLOSURE 2

PERTINENT REGULATIONS FOR FREIGHT SHIPMENT, RAILWAY EXPRESS OR AIR SHIPMENT

1. ICC Regulations for Freight or Railway Express Shipment:

a. Materials which emit gamma, or gamma, alpha and/or beta rays require the following:

(1) Minimum dimensions of outside container 4 inches.

(2) 200 mr/hr maximum intensity at surface of container.

(3) 10 mr/hr maximum intensity at 1 meter (39.3 inches) from source.

(4) Liquid materials will be packed with a sufficient absorbing material to contain all liquid.

(5) Labeled with a special red on white ICC label.

b. Any package which meets the following specifications is exempt from the above packaging and labeling requirements.

(1) Packaged to preclude leakage.

(2) Contains less than: 0.1 mc Radium or Polonium (d/m converted to mc)
0.13 mc Sr^{89} or Sr^{90} or Ba^{140}
1.3 mc any other activity.

(3) No significant alpha, beta, or neutron emission and surface gamma of less than 0.4 mr/hr.

c. For containers which do not meet the following limits, special permits must be obtained from the Bureau of Explosives.

(1) Radium, plutonium, or strontium must be packed in inner metal container of stainless steel, malleable iron or brass, maximum dimensions 3 inch diameter, 8 inch length. Minimum wall thickness $\frac{1}{8}$ inch and having screw closure.

(2) Not more than 2 curies Radium, Polonium, or other members of radium family.

(3) Not more than 2.7 curies of any other activity.

2. Post Office Department Regulations are essentially the same as ICC exemption specifications in 1b above.

3. Interim Air Shipment Regulations are as follows:

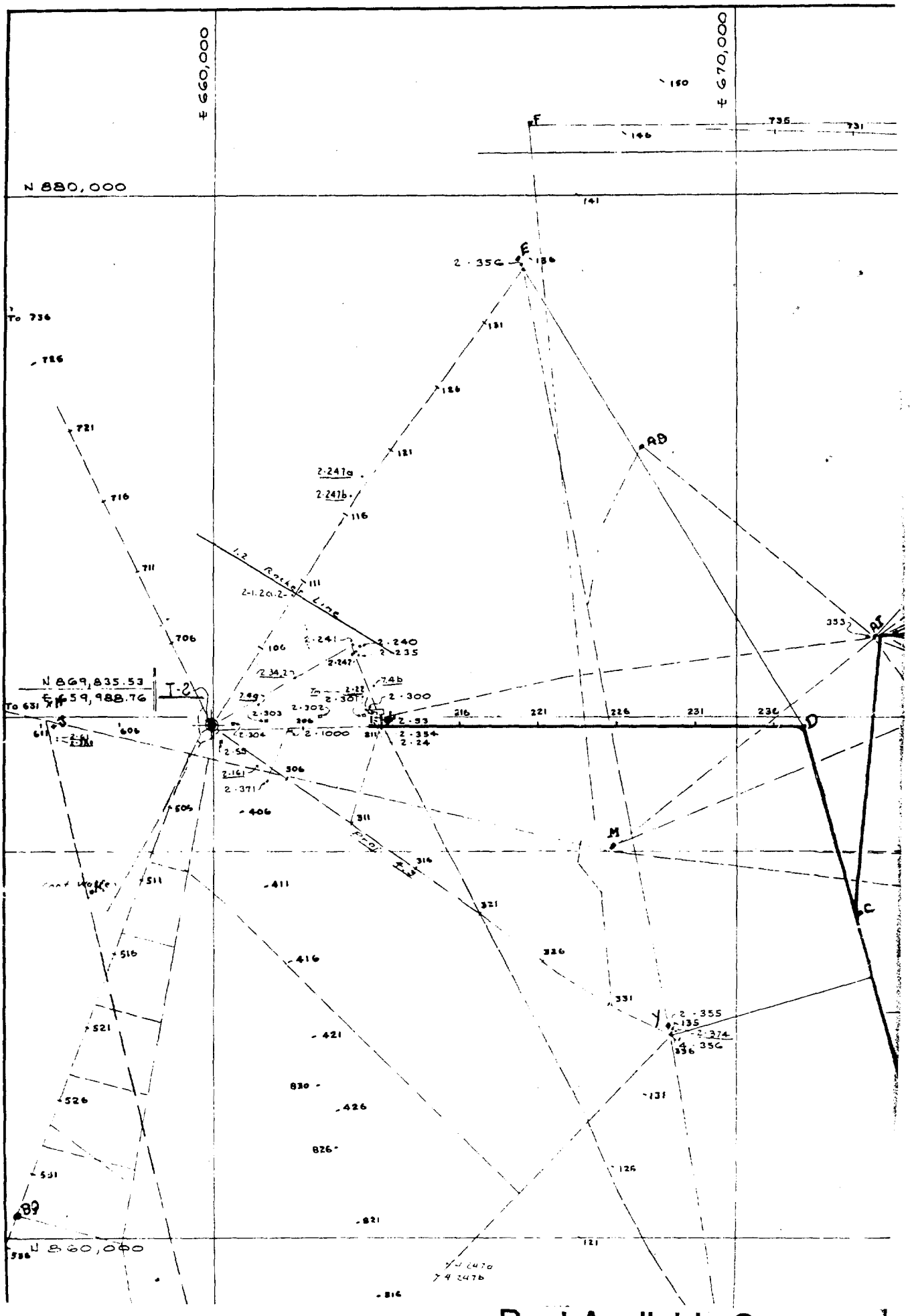
a. "Emit gamma and other rays with maximum rating of 1 gram equivalent of Radium" (1 curie).

b. "Encasement in lead for full protection of undeveloped film at 30 feet and full protection of all air line personnel and passengers."

c. Marked with "Do not place in same compartment with undeveloped film or mail."

APPENDIX A

GENERAL LAYOUT OF YUCCA FLAT AREA



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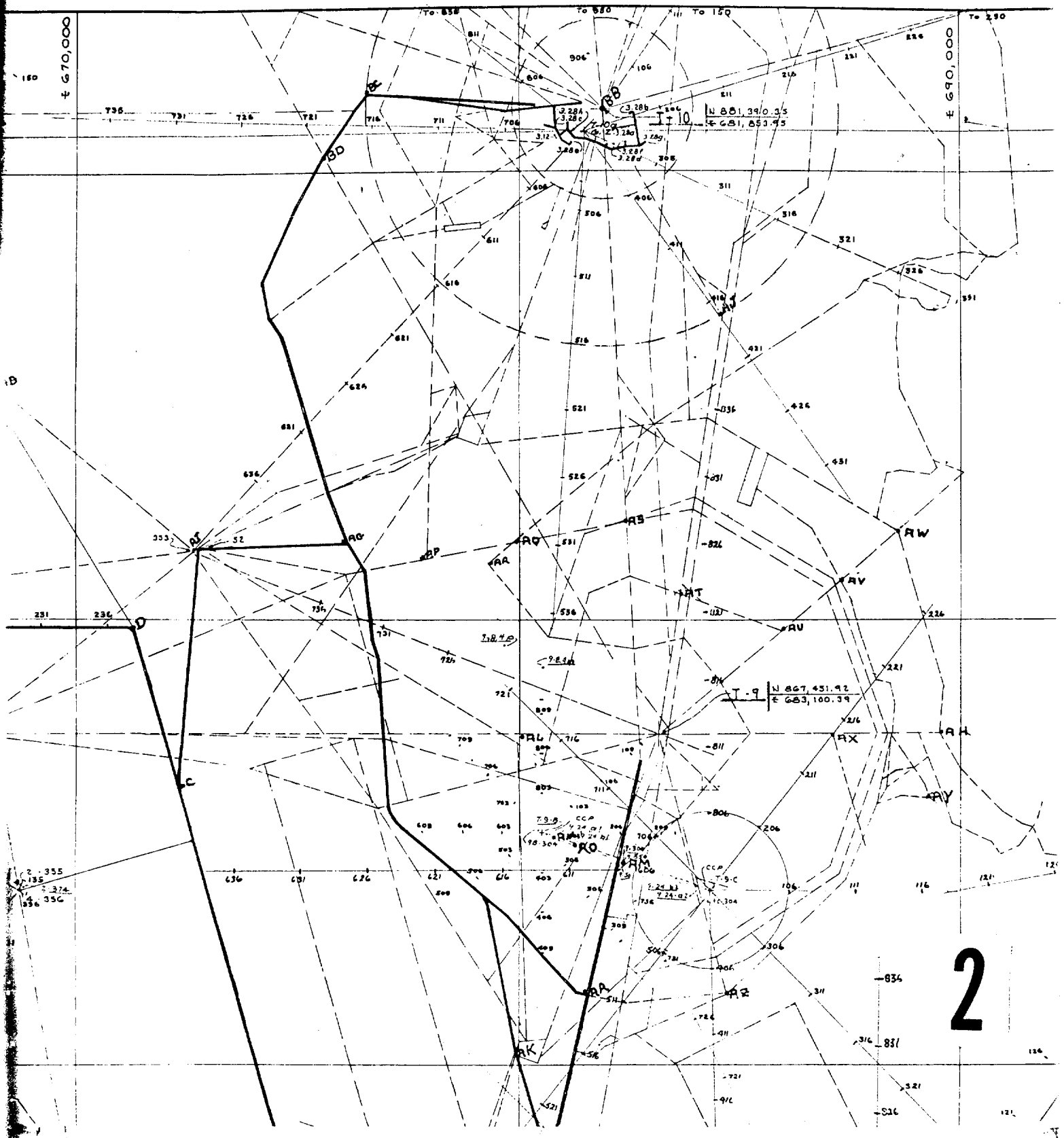

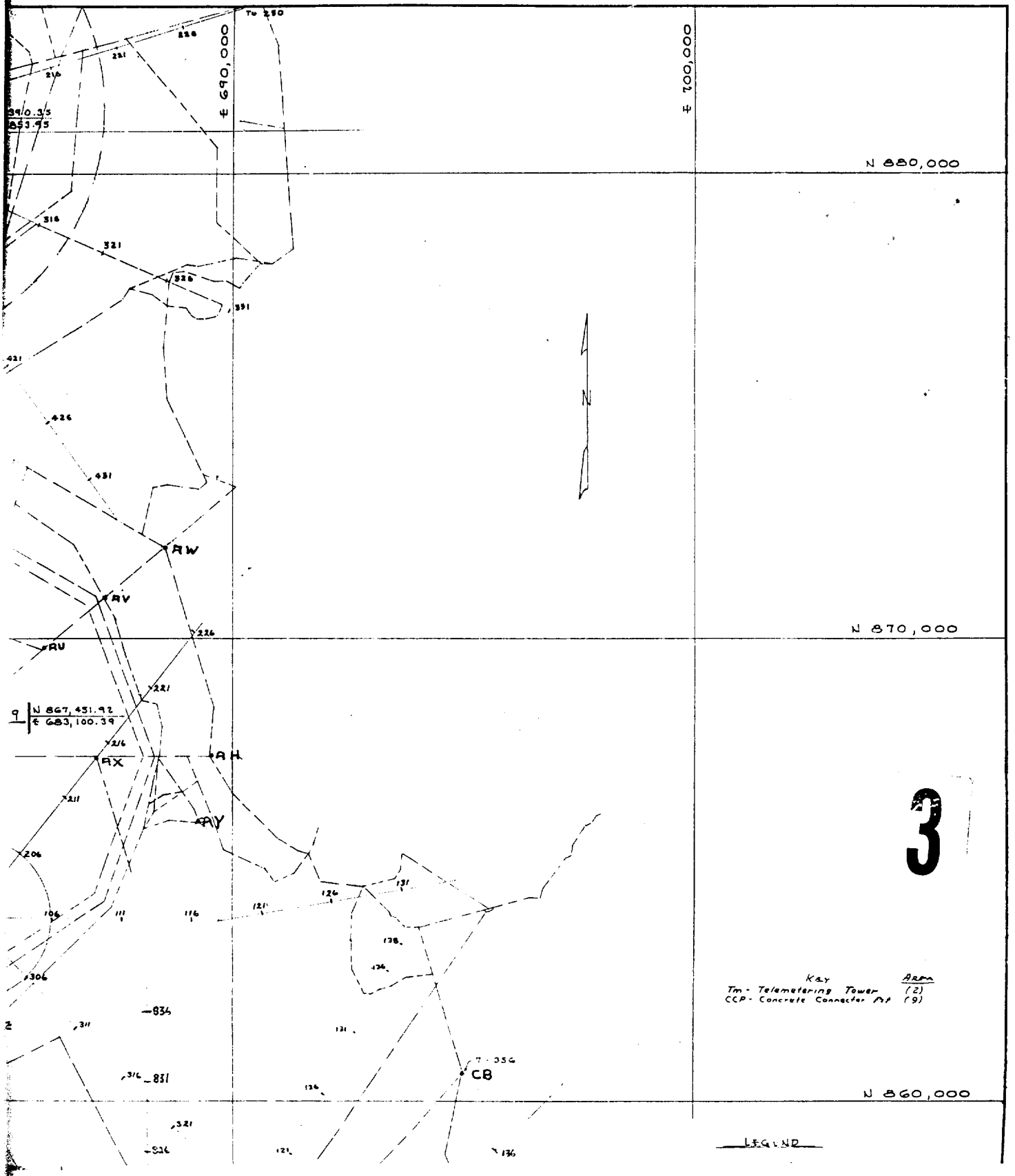

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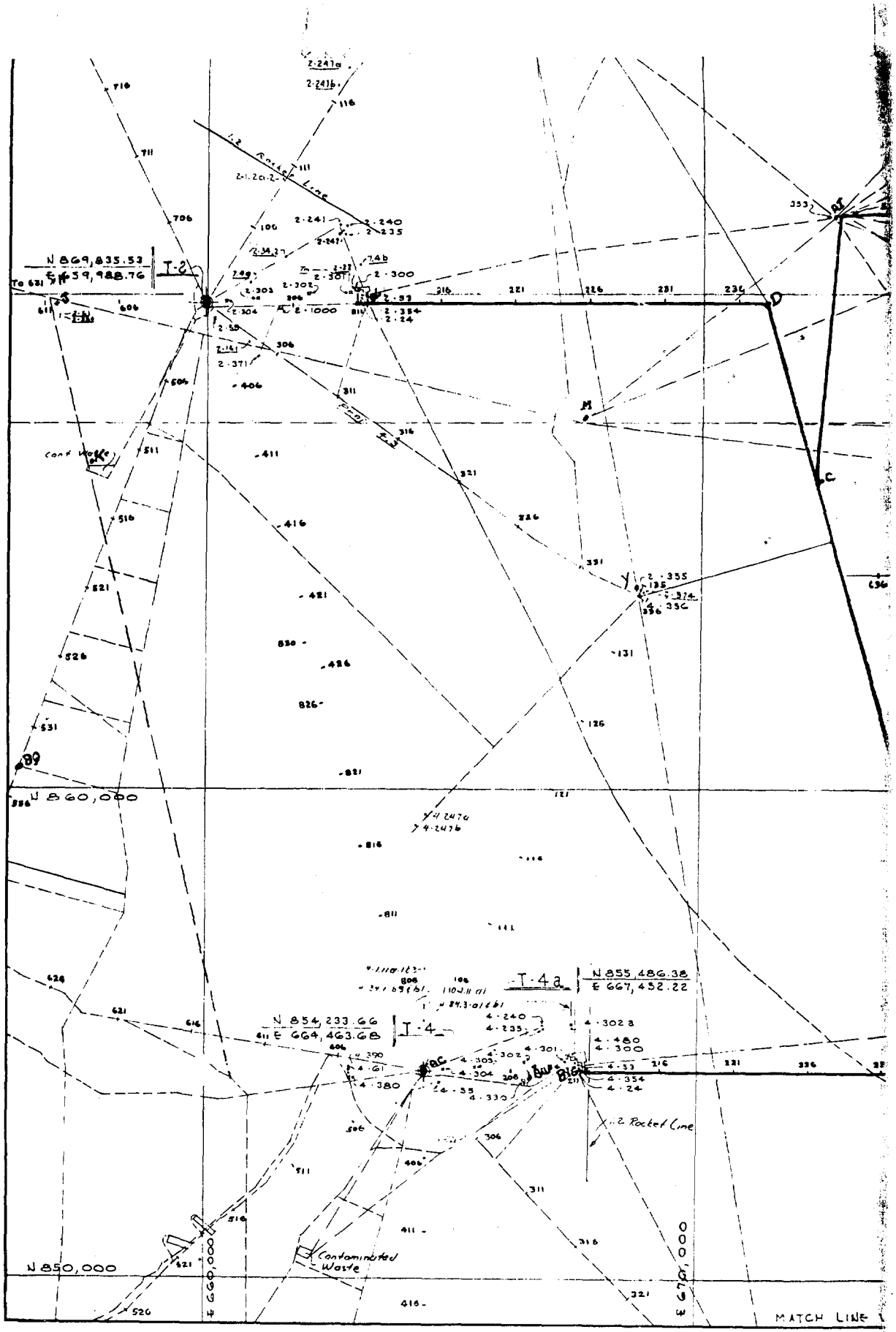

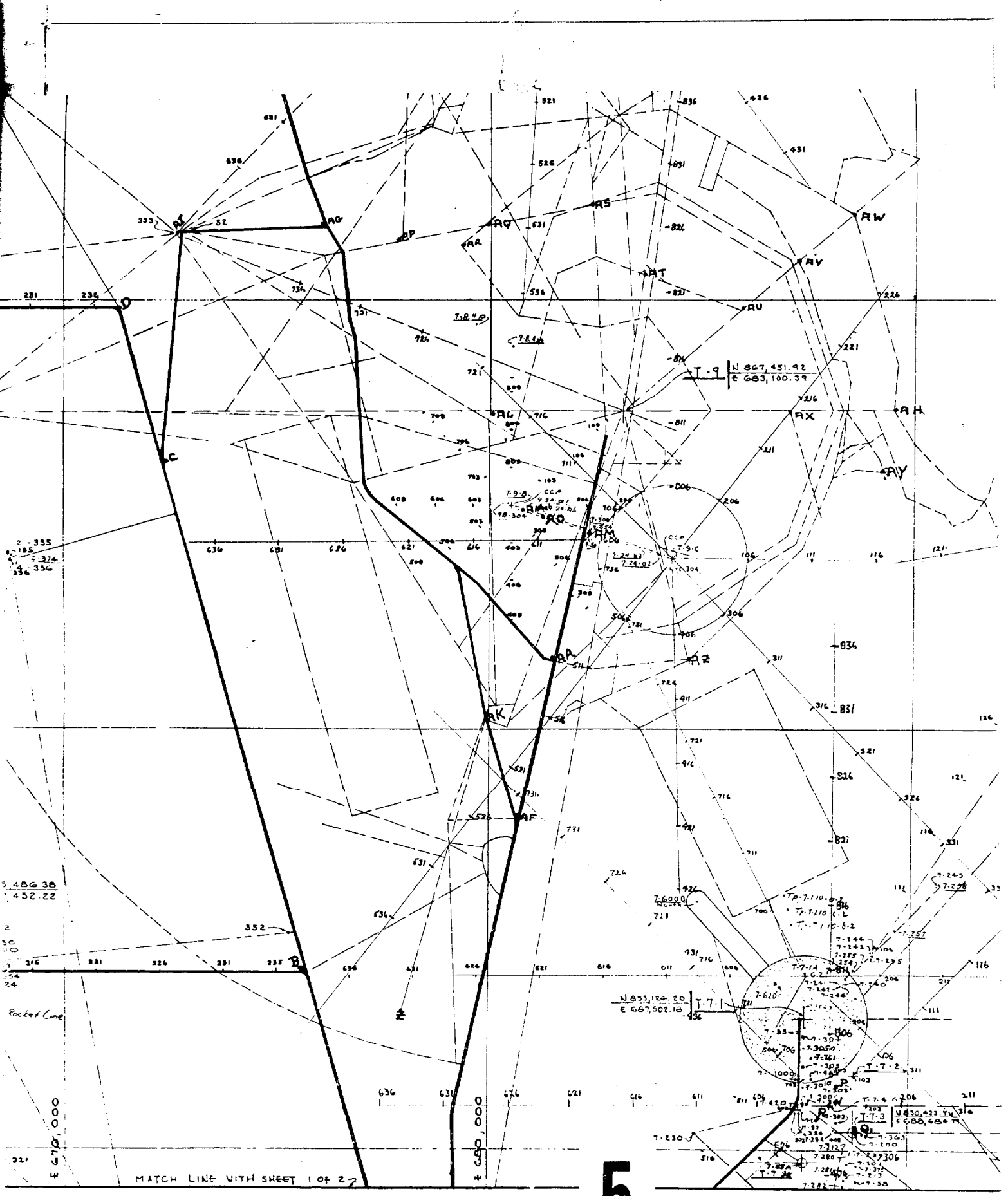

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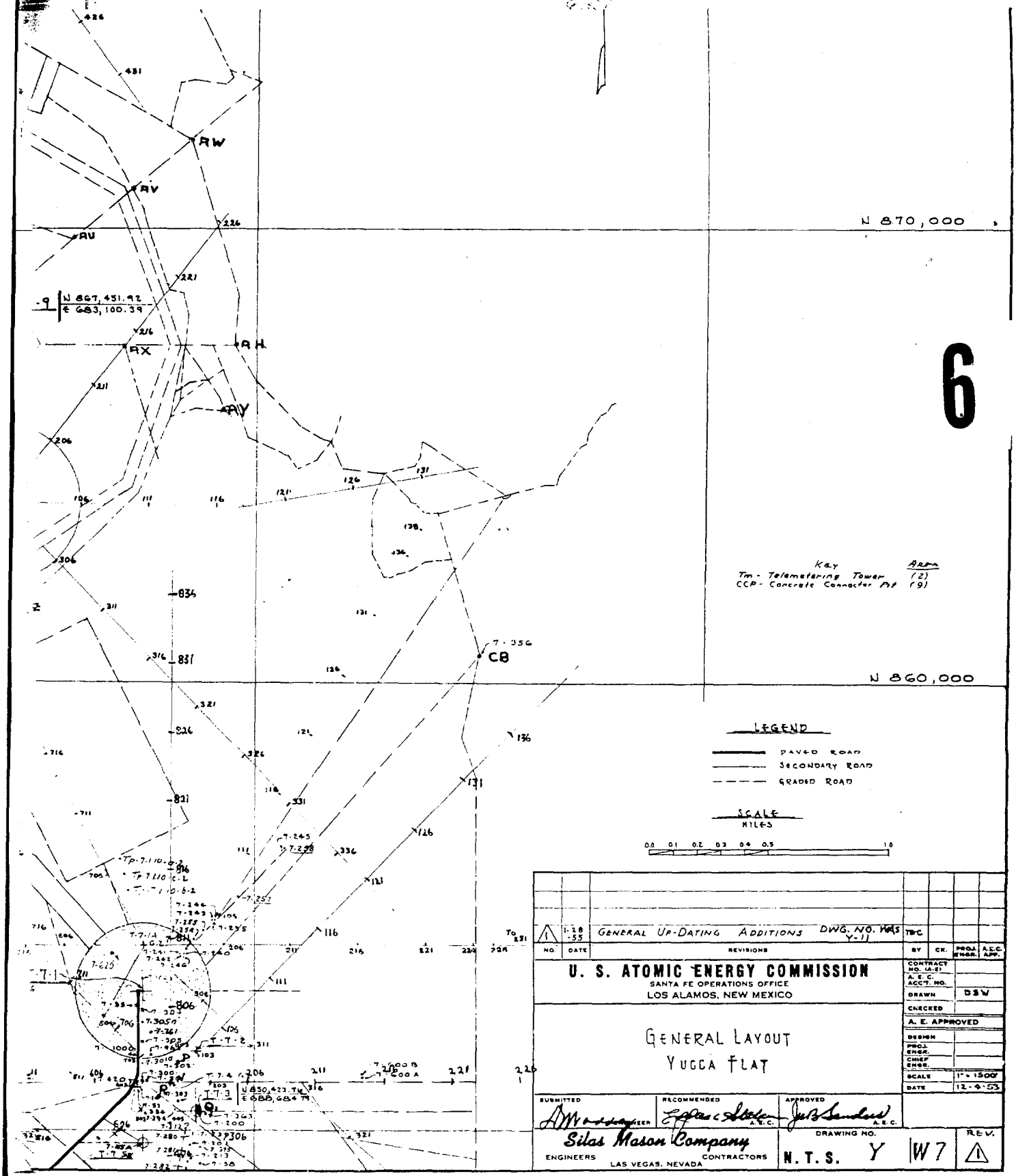


6

Key — Area
Tm - Telemetering Tower (2)
CCP - Concrete Connector Pit (9)

NO.	DATE	REVISIONS	BY	CK.	PROJ. ENGR.	A.E.C. APP.
1	1-28-55	GENERAL UP-DATING ADDITIONS DWG. NO. M&S Y-11	TPC			

U. S. ATOMIC ENERGY COMMISSION
SANTA FE OPERATIONS OFFICE
LOS ALAMOS, NEW MEXICO

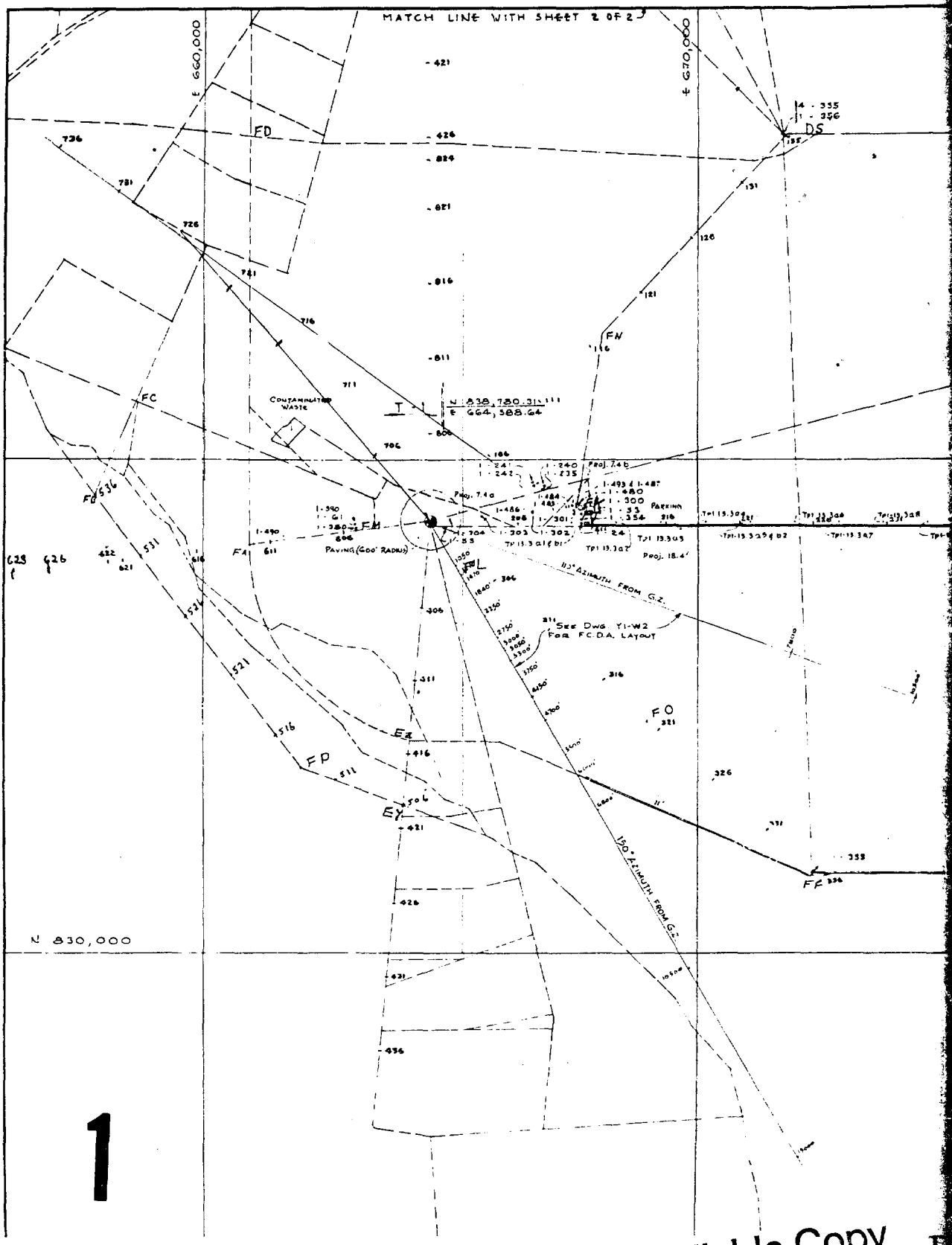
CONTRACT NO. (A-E)
A. E. C. ACCT. NO.
DRAWN: DSW
CHECKED
A. E. APPROVED
DESIGN
PROJ. ENGR.
CHIEF ENGR.
SCALE: 1" = 1500'
DATE: 12-9-53

GENERAL LAYOUT
YUCCA FLAT

SUBMITTED
RECOMMENDED
APPROVED
A.E.C.

Silas Mason Company
ENGINEERS CONTRACTORS
LAS VEGAS, NEVADA

DRAWING NO. N. T. S. Y W7 REV. 1



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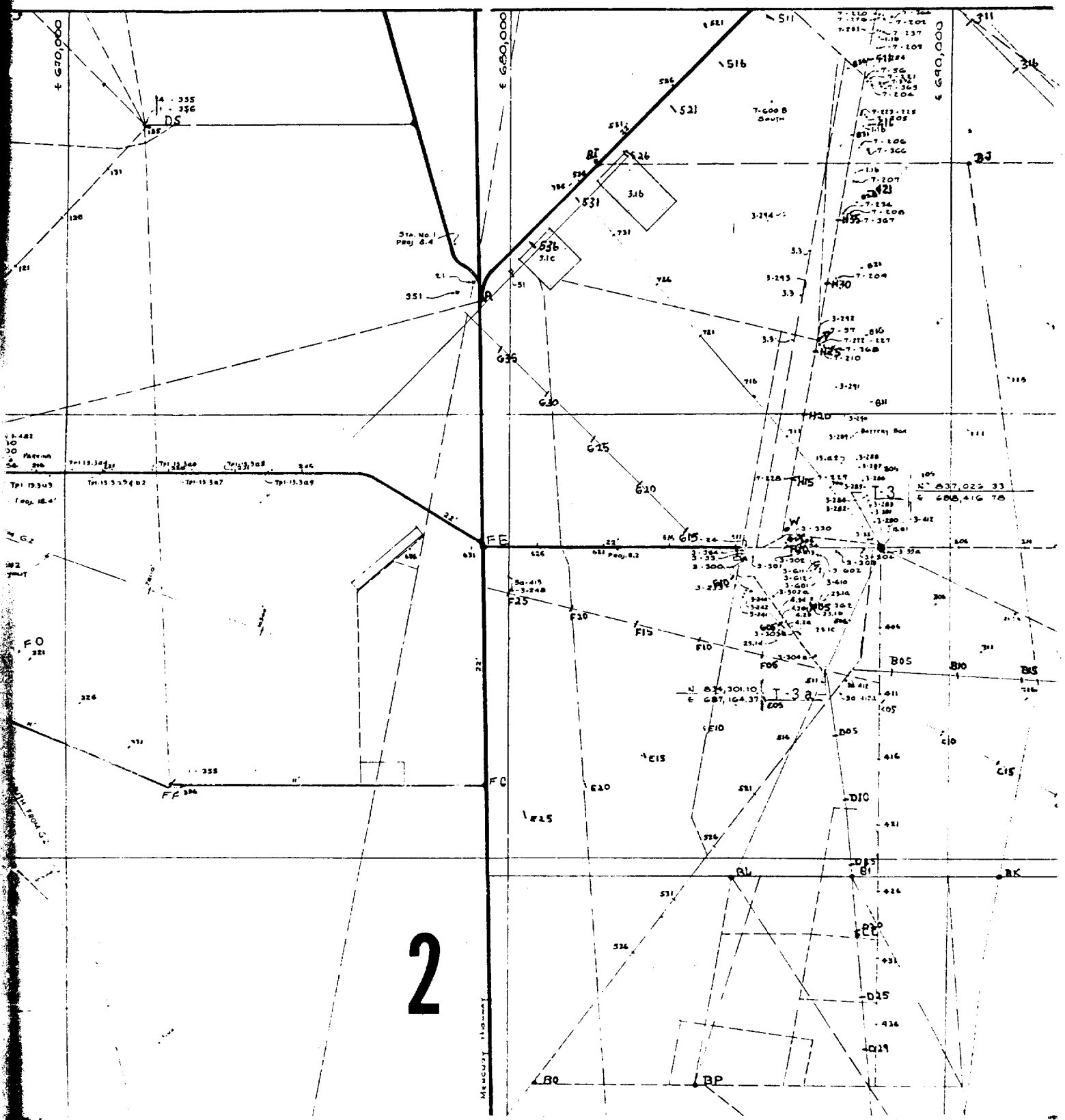
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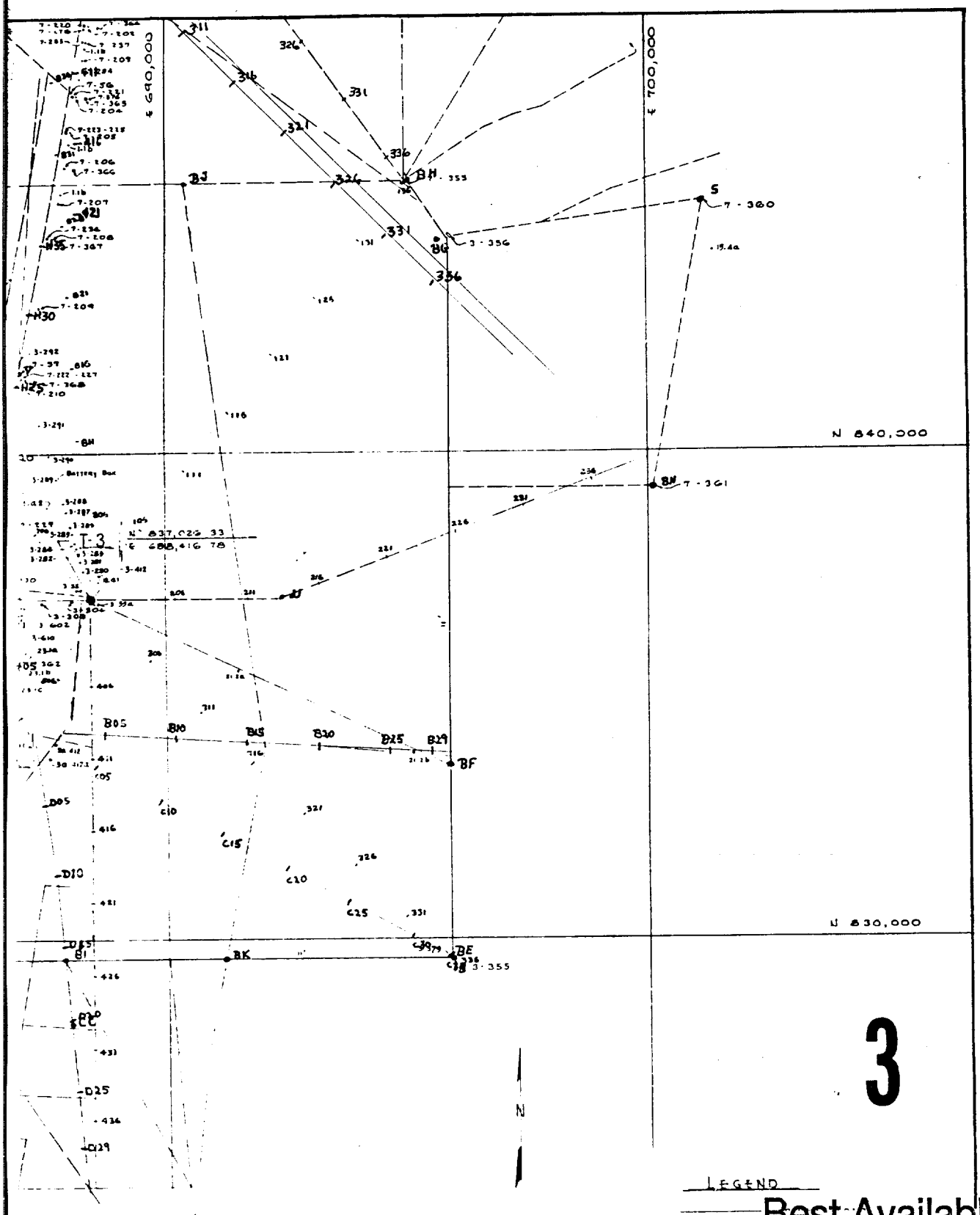
Battery Box
Mercury Highway
2
Best Available Copy



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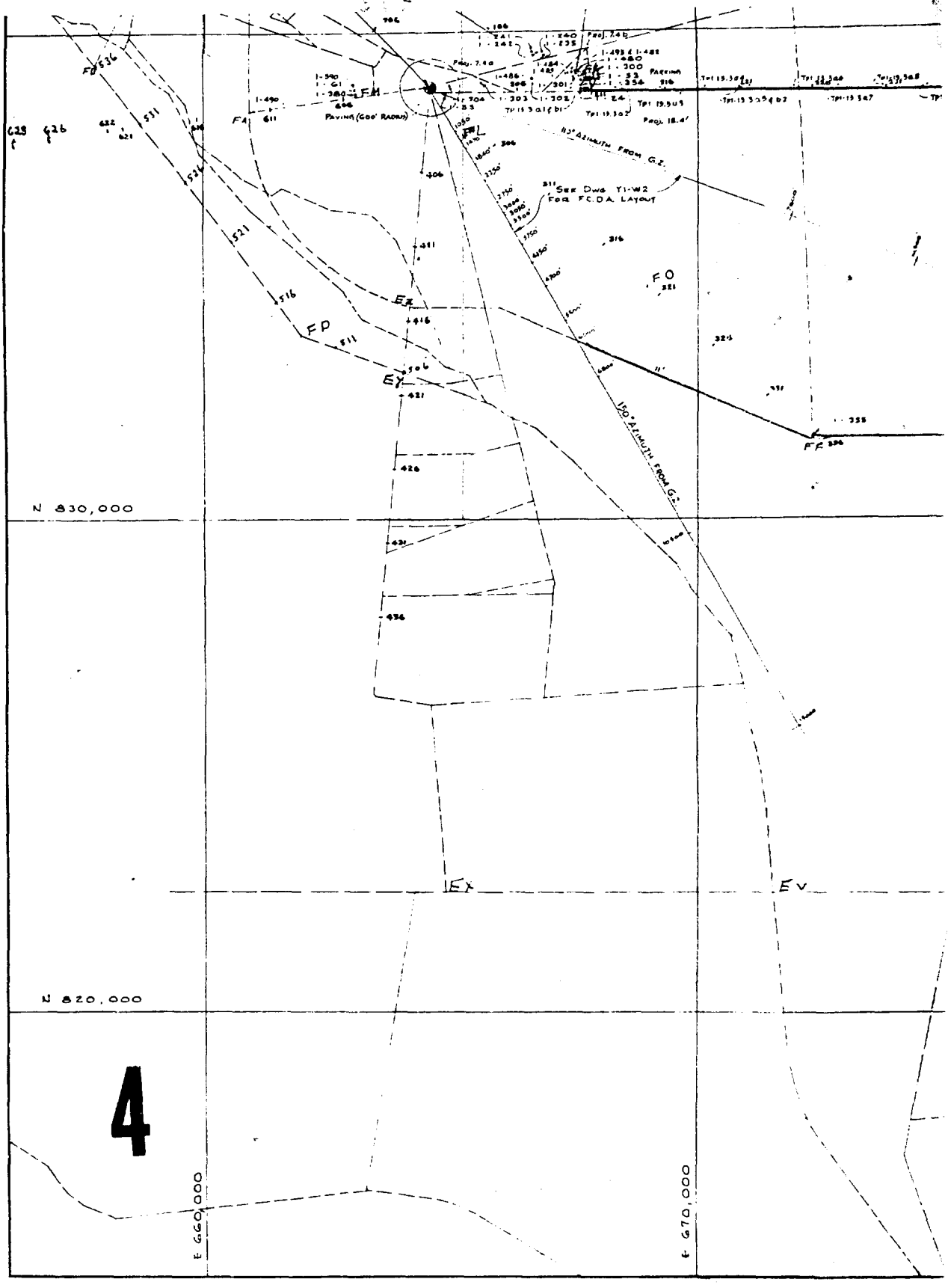
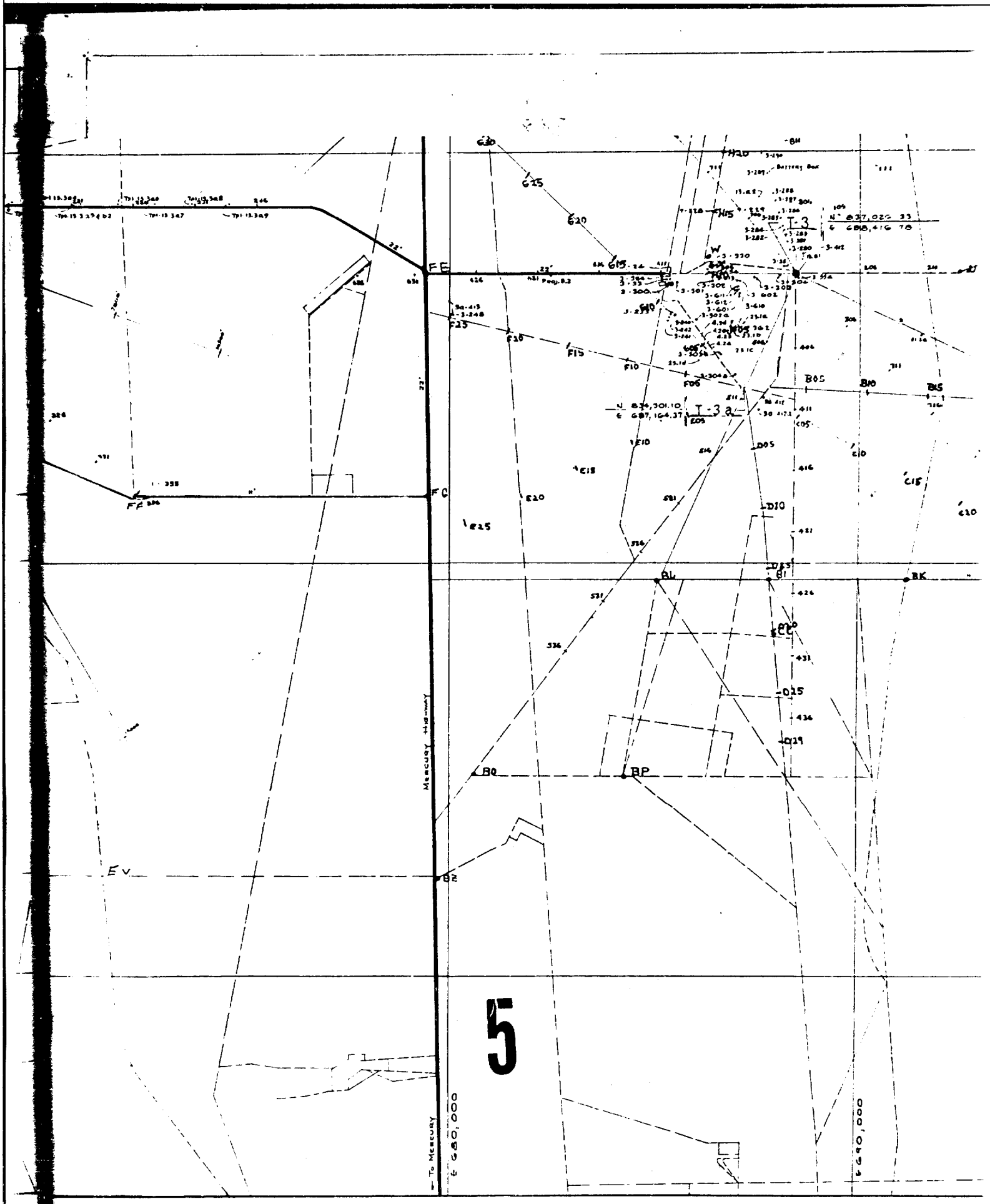
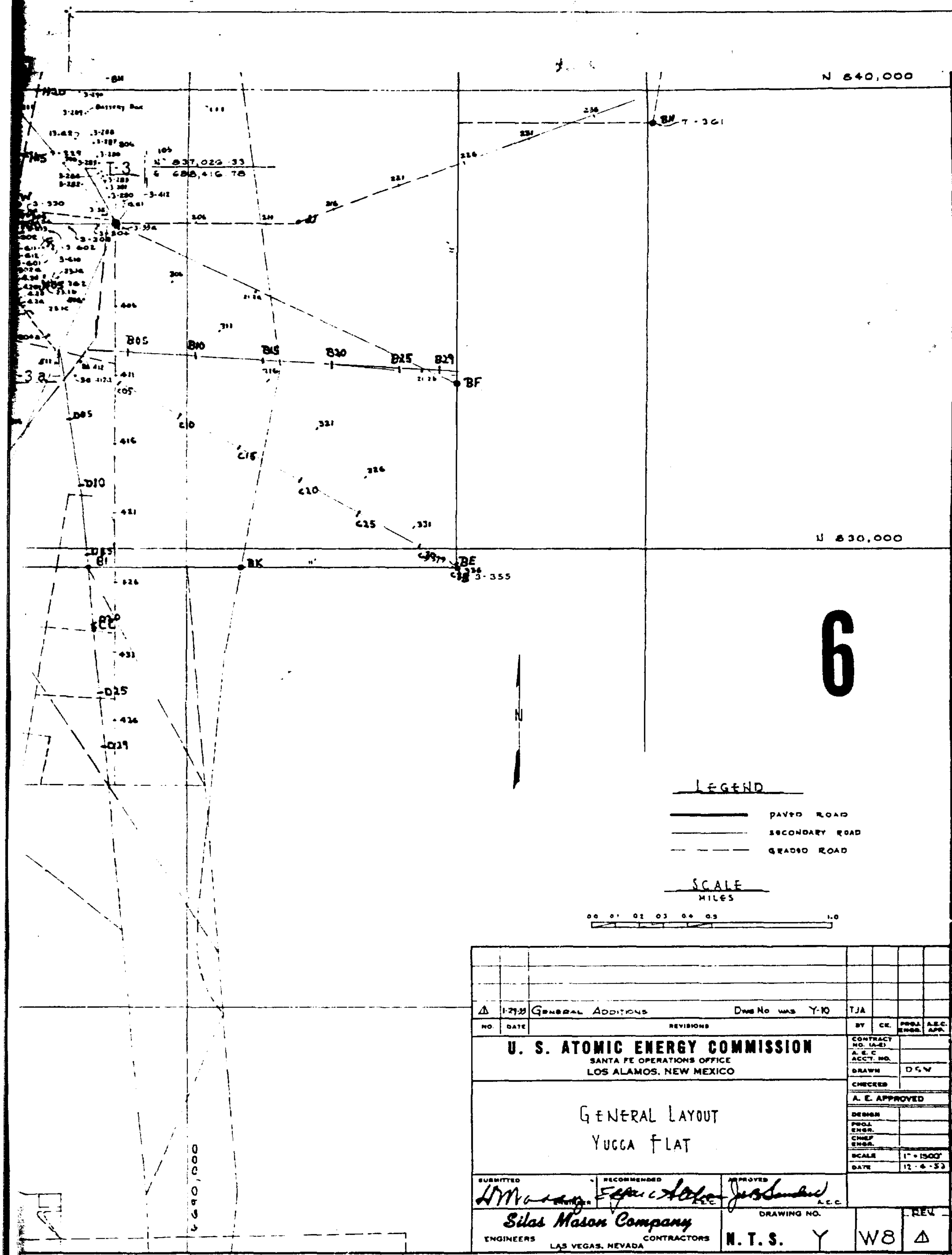
LEGEND







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